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FIG. 15. *Adromischus poellnitzianus* grown in New Zealand
by Marjorie Shields (see page 35)



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FROM NORTHRIDGE, CALIFORNIA

I had some Stapeliads that never bloomed. This year I followed Mr. Harry Johnson's advice on the use of a manure mulch (Journal, Vol. 30, pg 117) and several clusters bloomed freely. I find the three volumes of "The Stapeliaceae" by White and Sloane very helpful in identifying my plants; they have such clear illustrations.

FRED KELLER

FROM MINNESOTA

I live on a grain farm near Lake Park in the north-west part of the state, about 35 miles from Fargo, North Dakota and just a few miles from some of the best lakes and timber areas. We have a beautifully landscaped yard of about two acres with many flower beds and evergreens, pine, hemlock, and cottonwoods nearly 100 feet tall.

My first cacti were purchased from Johnson Cactus Gardens in 1947. The *Cereus* are now over 7 feet tall and the *Cephalocereus* and *Lemaireocereus* over 3 feet tall. I have three kinds of night-blooming *Cereus* all nearly 8 feet tall. Also a great many in the *Echinocactus* group as well as *Echinopsis*, *Mammillarias*, etc. My Old Man cacti are really going to be beautiful specimens in a few more years. I have an *Echinopsis* "Los Angeles" that is 15 inches tall and 37 inches in diameter, really a beautiful plant. My other "Paramount Hybrids" will bloom this coming spring.

I've had good luck in flowering my cacti—*Gymnocalycium*, *Astrophytum*, *Echinocereus*, *Hamatocactus*, *Lobivias*, *Thelocactus*, *Parodias*, etc. They had so many flowers that I lost count. I grow all of my cacti in a greenhouse with no white-wash on the glass. I leave the vents wide open all summer and about the middle of May I set every one of my cacti, including the 7 and 8 footers, outside and give them a good sprinkling with warm rain water. All of the soil in the pots is very dry when I do this so they will not become over watered.

I fertilize my cacti from May till the second week in August and once a week I give them all a Vitamin B₁ solution. Many of the plants in 5- and 6-inch pots I water freely every morning and my big fellows about every four days when it is sunny.

ROGER JENSEN
Lake Park, Minn.

STATEMENT OF POLICIES ON
CONVENTION PROCEDURE

The Executive Board of the Cactus and Succulent Society of America specifies the following items of policy for Conventions of the Society:

1. Preference is for a motel rather than a downtown hotel as convention headquarters. This should be very near or associated with a good restaurant and a meeting hall of some kind, e.g. a service club hall, lodge hall, school, or church social hall or meeting room in connection with the motel or restaurant. It is understood that details can not be specified because the situation varies in each community.
2. Formal meetings of the Convention shall be of three days duration; field trips, garden tours, visits to museums or botanic gardens, etc., shall be before and/or after the convention.
3. The Convention Program shall be printed by the Executive Board Convention Committee for distribution at the Convention. A resume, not giving times and dates, may appear in the Journal.
4. Information sheets and reservation blanks are mailed by the Executive Board Convention Committee in the month of March preceding the Convention.
5. Publicity concerning the Convention should appear in the Journal during the full year preceding the Convention and particularly in the first issue of the year in which the Convention is to be held.
6. The registration fee for persons more than 15 years old is \$1.50. No person who is not registered may attend the Convention sessions unless he is a guest or speaker invited by the President or the Convention Chairman.
7. The Convention Program may include no more than one "fun session", including the crowning of the King and Queen.
8. Papers and addresses on the Convention Program are limited to 45 minutes, the time limit being applied strictly.
9. The recommendations of the Cactus and Succulent Society of California, as presented by the President, Mrs. Anna M. Genasci, are endorsed by the Executive Board and called to the attention of all future Host Societies.

DESERT FLOWERS UNDER GLASS

The story of my experiences and delight in growing and flowering Cacti and Succulents in a small glasshouse in Christchurch, New Zealand

By MARJORIE E. SHIELDS

CHAPTER 11

Plants in the next group are for the connoisseur, for those who revel in the beauty and unusualness of plant form. Spectacular flowers will not be found here, but leaves like birds' eggs, scotch fans, and mottled marble, anything in fact except ordinary leaves are found on these *Adromischus* plants. The flowers which are produced on the upper half of long, thin stalks, each has a tiny green calyx supporting a $\frac{1}{2}$ inch tube from which breaks a small five petalled flower. In some the petals stand out around the tube like a frill, in others they fold back against the tube like a cuff with a frilled edging. The colour ranges from white through the pinks to maroon. When the group is in flower the long spikes look like ornamental grasses waving in the breeze. These plants come from South Africa, where they are found in Namaqualand and Cape Province growing in clusters or forming small bushes.

In front is *A. poellnitzianus*, named after von Poellnitz. Look at the queer, longish cylindrical leaves, gradually narrowing towards the base. They flatten and widen at the tips as though they were squeezed in the making and then the edges crimped together at the top to hold them together. They have a soft downy covering too for protection from the sun, but it has caught the tips and coloured them cinnamon to match the hairy stems. These hairs are aerial roots, they feel crisp to the touch, not soft like hair. The flowers on the top half of the 15 inch stem appear small and insignificant until observed closely. This one has a green tube breaking into white petals, red tipped and folded over the tube like a cuff.

A. cristatus is another with similar characteristics, in that it also has cinnamon coloured hairy stems, downy, grass green leaves coloured at the tips in the same manner as the other. But these leaves are like air filled cushions, triangular in shape and sealed along the top with a crimping iron, the result giving the plant its name. At the base they elongate sharply to form a short stem which attaches them to the hairy branches. The flower also is similar, that is, white with red tips, and they both bloom in the late autumn.

Another with its leaves waved along the top, but not to the same extent as the previous two has unfortunately no name. However it is a very beautiful plant with leaves shaped like a partly opened fan, the top crinkling to show where the fan is folded. These leaves are thick, but have not a blown up appearance, and elongate gradu-

ally until they meet the main stem. They are not down covered, but are dull grey-green in colour with shiny blotches of bright green showing through with just a hint of maroon as well. The pale maroon flower stem is spotted with tiny white dots, the colour changing to teal at the tips. Teal calyces hold the greenish maroon flower tubes which break into little pink flowers with pale green stamens just reaching the top of the tube. The colouring is lovely, making this a most desirable plant.

A. festivus approaches it more nearly than any of the others as far as the colour is concerned. These leaves too, being dull green with shiny splotches of bright green and purple, but in shape are large fat cylinders tapering at the stem end, also tapering slightly and flattening at the tips, which are crimped. It is a beautiful species and is usually described as being like plovers' eggs, or like sausage balloons in *resida* green superbly marbled with purple blotches and with the ends gathered into a little frill. Baby plants are real jewels, looking like clusters of Scotch pebbles with their exquisite colouring. Two foot long flower stems, thicker than most, are purplish to match the marbling, as also are the short stems holding the flower tubes which break into pale purple-pink petals with deeper coloured tips, curling round the top of the tube. The stamens are so deep into the tube they do not show.

Another beautifully marked one with even brighter colouring is *A. maculatus*. Its name meaning "spotted or stained" is truly descriptive, for these thick, wide leaves are blotched and stained with maroon, and the brighter the sun, the brighter will be the colouring on the leaves. The leaf shape is rather variable, some being longish and coming to a tiny point, others just the reverse, being wide with a small indentation at the top. The maroon flower stems are faintly spotted with white and are shorter than the majority, being barely a foot long. The flower tube has a longish stem and the very tiny petals fold back tightly against it. The stamens extending beyond the petals look startlingly white against the deep glowing maroon inner surface of the tube. These flowers are very showy even though the pink petals are so small. This is one rather like *A. maculatus* but not nearly as highly coloured is *A. gracillimus*, a treasure from S. W. Africa, the name meaning "most slender

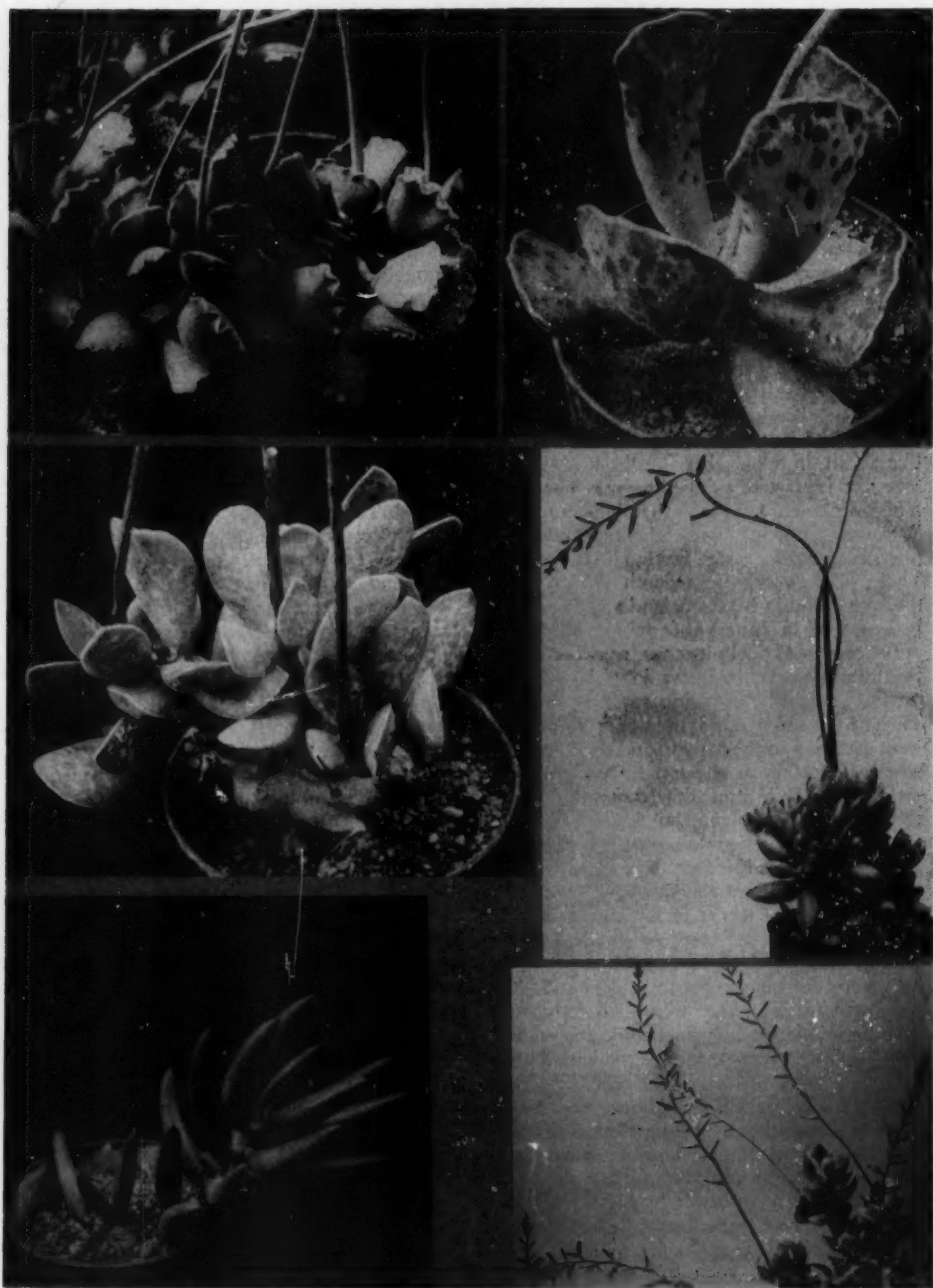


FIG. 16. Top left, *Adromischus cristatus*; top right, *A. species*; left center, *A. gracillimus*; right center, *A. species*; bottom left, *A. mamillaris*; bottom right, *A. rotundifolius*.

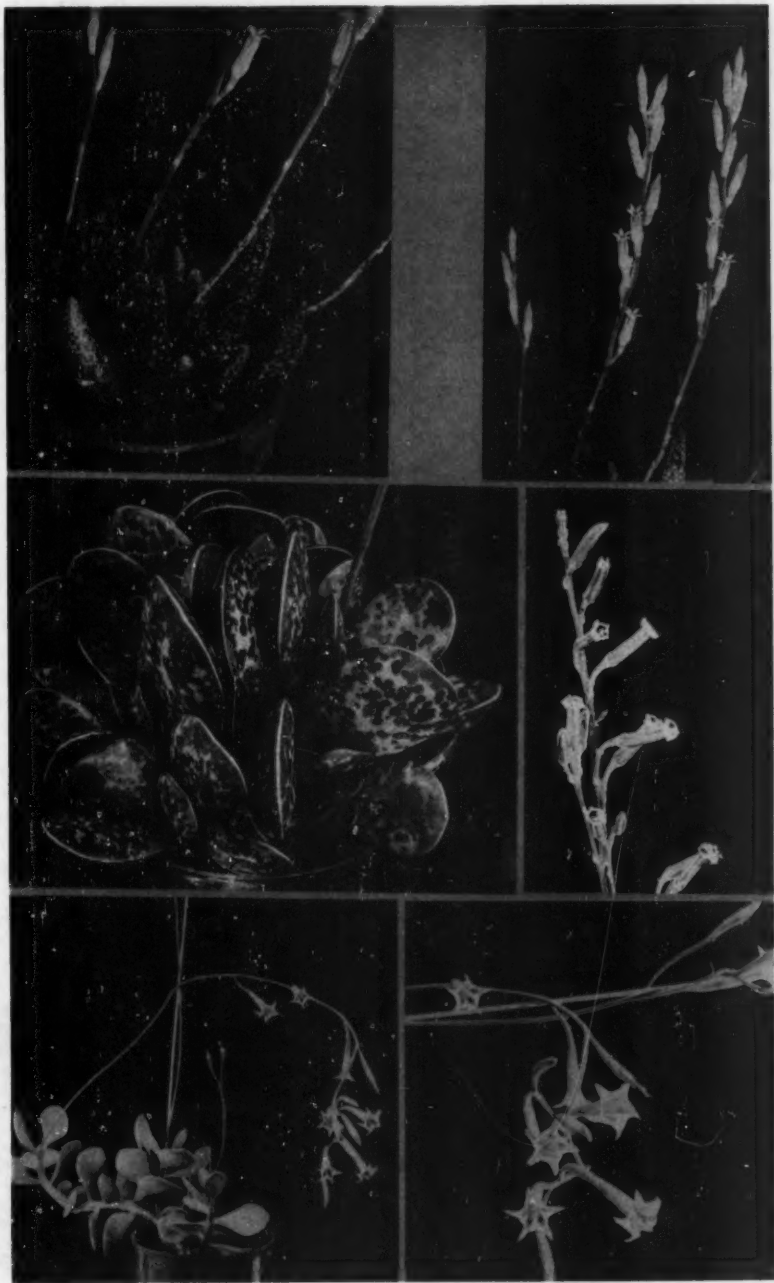


FIG. 17. Top left, *Adromischus hoerleinianus*; top right, flowers of same; center left, *A. maculatus*; center right, flowers of same; bottom left, *A. bolusii*; bottom right, flowers of same.

or very thin". The leaves are a little longer, though smaller than those of *A. maculatus* and the mottling much paler. Its growth is very slow and it has yet to flower.

Here is one with spindle shaped leaves called by many *A. clavifolius*, but this cannot be correct as *clavifolius* means "club shaped" and these fat, cylindrical leaves are pointed at both ends just like a spindle. Also *A. clavifolius* should have a stem covered with aerial roots and the tips of the leaves should be slightly flattened and crimped. The little leaves on this wrongly named one are short and fat, wax coated and spotted at the tips with red. They detach themselves very readily and are even pushed out by the others when they become over crowded, and, like the *Crassula namaquensis* we saw a short time ago these leaves too are sometimes equipped with tiny rootlets. It forms a good clump if left alone, but can be unsightly with bare stems if handled. It waves a very crooked flower stem and its little blossoms of palest pink with bronze mid ribs stand out around the green tube like a star. Another with the same colouring is labelled *A. glaucifolia* but these leaves are not "bluish green" nor are they covered with a white powder. They are grass green, spotted with red, and are long, narrow at the base, wide at the tips coming to a blunt point, rather like a larger addition of the previous one only with the tops so much wider. The flowers are dirty pale pink, greenish pink perhaps, with the green showing through from the inside of the tube and with greenish yellow stamens.

Look at this one with its purplish red roots reaching to the ground—outside the pot instead of inside! It would be better growing in a pan rather than in a small tin, as these stems are prostrate and root at the joints. It is *A. mamillaris*, meaning "tuberculate", with long cylindrical leaves pointed at both ends. They are plain green with no spotting, but full sun colours them purplish. The branches, the flower stems and flowers are all purplish. Quite attractive. The tube is green and the purplish red petals, curled and waved, fold back against the tube. All these with the exception of the first two flower in the summer.

Here is another late autumn flowering one, this one also has long cylindrical leaves pointed at both ends. It is *A. hoerleianus* and is the most colourful one in the group. The dull green leaves are spotted with shiny raised red markings, giving the leaf a roughened surface. A red splodge marks the tip of each leaf. Even the pinkish green 8 inch flower stems are spotted to add to its attractiveness. The flowers also are a little different. The pale pink petals are edged with red and each petal is separate, (they over-

lap in other *Adromischus* flowers) and form a star rather like a *Crassula* flower, but as they mature they too fold back against the tube. These short stems make it look very different also.

Only two left to see now, white *A. rotundifolia* with "round leaves" and a similar one with green leaves. The leaves of *A. rotundifolia* are covered with white waxy scales having the appearance of mica; this is their protection from the hot sun. The red blotching on the others serves the same purpose. This plant grows into a little shrub with thick brown branches also white coated, as is the two foot long flower stem. The green flower tubes open to spread their five pointed pale pink petals with deeper mid ribs, to show the stamens. The starry flowers are larger than some.

The plain green one does not look nearly as interesting. It is *A. bolusii*, named after H. Bolus, Cape Town, and has the loveliest flower of them all, over half an inch wide! This was a wonderful surprise, but I should have been prepared. It so often happens when the plant itself is not spectacular the flower very often is. These pink flowers have a deep pink brush mark on each petal, which widens as it reaches the green throat. A cream stamen rests against each petal, others deeper in the throat. Viewed from the back the flower is just as beautiful as the deep pink mid rib is brighter on the reverse of the petals and merges into the tips of the tube, while the paler pink of the spreading petals look like wings. These blossoms are trumpet shaped and do not recurve against the tube. There are many other interesting *Adromischus*, unfortunately extremely difficult to obtain here. However there are enough on the bench to arouse interest, to fire the imagination, and to show that leaves alone can be just as spectacular as flowers.

COLORADO CACTOPHILES

Officers for 1959 are: President, Mrs. Peggy Chambers; Vice-President, Frank Stiles; Affiliate Director and Program Chairman, G. J. Tomlin; Recording Secretary, Mrs. Elizabeth Lehman; Corresponding Secretary, Mrs. Elizabeth Eckstein, Rt. 1, Evergreen, Colorado. We have just closed a very active year under the presidency of Mrs. Julia Willis and are anticipating continued growth of interest and membership under Mrs. Chambers' administration. Our notebooks are bulging with pertinent material on the 8 sub-tribes of Cacti, and our files of colored slides of native Colorado and other Cacti is constantly growing, through the activity of our several camera enthusiasts.

ELIZABETH ECKSTEIN

FROM TEXAS: "It is interesting how very much alike the present Journal is to the very first one. I don't imagine many magazines, that have been in existence that long have kept to the original design on the cover."

MRS. GROSS SCRUGGS

POLLINATION REQUIREMENTS OF THE SAGUARO (*CARNEGIEA GIGANTEA*)¹

Stanley M. Alcorn², S. E. McGregor², George D. Butler, Jr.²,
and Edwin B. Kurtz, Jr.³

Personal observations and reports (Shreve, 1910; Wilder, 1940) indicate that at least in some areas along the eastern fringe of the range of the saguaro (*Carnegiea gigantea* Britt. & Rose), the plant is not repopulating. While many factors may influence repopulation, it occurred to us that a major one could be the availability of viable seed as reflected by pollination requirements.

Kerner (1897) stated that the anthers of some species of *Cereus*, *Echinopsis*, and *Mammillaria* are covered with pollen when the bloom opens but that the stigma lobes, which "project considerably beyond the anthers," are closed. Thus the initially available pollen is usable only for cross-pollination. Later the stigma begins to elongate rapidly, thus facilitating contact with pollen-bearing insects. Finally the style shrinks, subjecting the stigma to the possibility of self-pollination.

The flower of *C. gigantea* is known to open at night (Benson, 1940; Peebles and Parker, 1946) and the bloom remains open less than 24 hours, usually closing in the late afternoon. Although pollination has been considered to be effected mainly by insects (Peebles and Parker, 1946), so far as we know actual pollination studies have not been reported. The present paper is a report of our initial investigations of the pollination requirements of the saguaro.

Effect of Methods of Pollination and Sources of Pollen on Fruit Set

About a week before the first flowers appeared on a saguaro arm, it was wrapped with window screen so that about 1 foot of screen extended, tube-like, beyond the end of the arm. A cage was formed by covering the open end of this tube with cheesecloth. Each of the following treatments was repeated on 5 arms.

- Cage 1. During the flowering period, 50 to 100 honey bees (*Apis mellifera* L.) were kept continuously in the cage.
- Cage 2. A soda straw was placed over the stigma and style, and pollen was brushed onto half of the stigmas so treated. The others were left undisturbed. The straws were folded at the outer end to prevent the possibility of wind-blown pollen contacting the stigma.
- Cage 3. Same as "Cage 2" except that when each straw was placed over the stigma the anther-bearing perianth tube was removed with a knife; that is, the flowers were emasculated.
- Cage 4. Flowers were left undisturbed in the cage.

In addition flowers and fruits were counted on 10 uncaged arms to determine the normal percentage of fruit set. In cages 2 and 3 the pollen was applied 12 hours before the bud opened (prebloom) or 12 hours after the flower opened (bloom). The flowers that were hand-pollinated received "bulk" pollen, pollen which may have come from the same flower, pollen from another flower on the same arm or plant, or pollen from other plants.

On arms with cages containing honey bees (cage 1), 272 buds produced only 2 fruits (1%). In comparison, the 10 uncaged arms had 519 buds that matured into 218 fruits (42%). Of the 519 buds formed, 128 (25%) died shortly after their appearance. Records of 226 flowers showed that those not successfully pollinated were shed on an

¹Arizona Agricultural Experiment Station Technical Paper No. 488.

²Respectively Crops Research Division and Entomology Research Division, Agricultural Research Service, U. S. Department of Agriculture, Tucson, Arizona.

³Respectively Departments of Entomology and Botany, College of Agriculture, University of Arizona.

average of 3 days after they opened. In the cages in which the flowers were left untreated (cage 4), 101 buds produced only 1 fruit (1%).

Further results of this study (Table 1) show that pollination must occur for a fruit to be formed and that pollination may occur during a period of about 24 hours. Of course, pollination under natural conditions would be restricted to the period that the flower is open.

TABLE 1. Fruit set of saguaro buds unpollinated and pollinated by hand.

Flower Stage and Treatment		Unpollinated		Pollinated	
		Buds No.	Fruit Set %	Buds No.	Fruit Set %
Prebloom:	Strawed* (cage 2)	61	2**	54	17
	Emasculated* (cage 3)	52	0	59	32
Bloom:	Strawed (cage 2)	19	0	14	21
	Emasculated (cage 3)	29	3**	28	57
Totals		161	1**	155	30

*Natural pollination of the buds was prevented by enclosing the stigmas with straws or by emasculation.

**May have been accidentally hand-pollinated.

Necessity for Cross-Pollination

From our observations the positional relationships and appearance of the stigmas and anthers in saguaro flowers agree with Kerner's (1897) statements about *Cereus*, *Echinopsis*, and *Mammillaria*. At first the stigma lobes of the saguaro are lightly compressed, but by mid-morning the individual stigma lobes may be widely separated and slightly elevated above the level of the anthers. As the day progresses the stigma lobes gradually close, but not tightly, and are somewhat retracted into the perianth tube. Although these positional changes of the stigma suggest that the saguaro flower is self-fertile, our tests show that it is actually self-sterile.

Forty-six flower buds were individually protected. Sixteen buds were artificially self-pollinated and 30 buds were hand-pollinated with pollen from flowers of other saguaro plants. None of the artificially self-pollinated buds set fruit, whereas fruits developed from 80% of those cross-pollinated by hand. The failure of fruit set in the cages with honey bees further suggests that flowers on the same arm are not cross-compatible. Thus for a flower to set fruit, it must receive pollen from at least a flower on another arm or possibly from a flower on another plant.

Effect of Time of Pollination on Fruit Set

To determine the time of day when the saguaro flower is pollinated, soda straws with one end folded were placed over the stigmas and styles of a number of buds at various times on May 20 and 21, 1958. The number of fruits set in each treatment was recorded on June 6 (Table 2). It is apparent from the results that pollination of the saguaro occurs mainly at night or near sunrise.

TABLE 2. Effect of time of pollination on fruit set of saguaro.

Treatment*	No. buds	% set
Straws on continuously	55	0
Straws on at 5:00 a.m. (sunrise)	51	47
Straws on at 9:00 a.m.	56	54
Straws on at 7:00 p.m. (prebloom) and off at 10:00 a.m.	47	2
No straws	50	58

*All treated buds opened during the evening of May 20, 1958.

Pollinating Insects Observed Visiting the Saguaro Flower

The description of the saguaro pollen grain by Kurtz (1948) indicates that the pollen grain is probably too large to be wind-blown. Thus cross-pollination in the saguaro must not be by wind but by flying animals, either insects or others. This was confirmed by the lack of fruit set of untreated caged flowers.

To determine what insects might serve as pollinators insect collections were made from saguaro flowers from 5:00 a.m. to 8:00 p.m. on May 21, 1958, and at intervals throughout the flowering season. Between 5:30 a.m. and 12:30 p.m., 7 blooms had a total visitation of 60 nectar-collecting and 340 pollen-collecting honey bees. Two species of wild bees made 8 visits. All pollen collectors ceased activity by 8:00 a.m., whereas nectar collectors visited throughout the observational period. Observations of 7 blooms on June 5, 1958, between 6:10 a.m. and 7:00 a.m. revealed 112 visits by honey bees and 30 by wild bees. It was noted that early in the day, and particularly early in the flowering season, the honey bees usually collected pollen or nectar from a single blossom. As the day and the season progressed, however, each bee visited several blooms on an arm or on several arms before departing. The wild bee always visited a number of blooms in rapid succession, pausing for only a fraction of a second at a flower, often on the stigma.

The study of time of pollination in saguaro suggests that pollination mainly occurs at or before dawn. However, the daytime observations of blossom visitors show that honey bees and wild bees, both known to be effective daylight pollinators of many plants (Bohart, 1952; Vansell and Griggs, 1952), are present in abundance. It must be remembered, though, that the honey bee has been present in the West for only approximately 100 years (Todd, 1950), and, therefore, its role as a pollinator must be ignored when considering the present stands of old saguaros. Records have not yet been made of pre-dawn visitors of saguaro flowers, so that the kind of animals involved in cross-pollination during the night hours is unknown.

Abundant pollen was usually available in the flowers until 10:00 to 11:00 a.m. early in the season (early May), but as the flowering season progressed (June) pollen was absent by 8:00 a.m. Thus the length of time a flower may be used as a source of pollen for cross-pollination changes during the flowering season.

Although positive determinations were not made of the pollination agent or agents, the fact was established that saguaro fruit set is dependent upon cross-pollination. This suggests that environmental factors that influence the pollinating agents would in turn influence the amount of fruit set and, therefore, the amount of seed available for repopulation.

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FIG. 18. A plant of *Echeveria subrigida* collected in Mexico by Fritz Schwarz.
Photo by Myron Kimnach.

ECHEVERIA SUBRIGIDA

By MYRON KIMNACH

It is intriguing to observe the reactions of visitors strolling through the succulent house at the UC Botanical Garden in Berkeley. Few are especially interested in succulents, and among our many hundreds of species, belonging to 27 families, only four plants cause consistently startled or enthusiastic reactions: a large grafted crest of *Cleistocactus strausii*, which everyone pets to test its softness, *Echeveria gibbiflora* var. *carunculata*, which they assume to be afflicted with a loathsome disease, *Adenium obesum*, with its superb flowers, and *Echeveria subrigida*, which invariably causes gasps of admiration, even from bored husbands tagging along behind their wives.

Among all the gorgeously formed or colored *Echeveria* species and hybrids, *E. subrigida* is

quite possibly the most beautiful, yet its supremacy is attained by subdued color and simple form. Its rosette, reaching fully a foot in diameter, forms a graceful, laxly-expanded whorl of lanceolate leaves thickly covered with a pure white powder, the underlying green epidermis contributing a slight bluish cast, and as a final, masterful touch each leaf is bordered with deep pink. The overall effect is rather overpowering, even when the plant is in bloom, for the flowers are very large and deep orange, with white-powdered bracts and sepals.

In 1892 Pringle first collected the species not far west of Mexico City. Rose later brought a plant from Mexico which was cultivated for a time at the Missouri Botanical Garden, and Brit-

ton and Rose¹ remarked that it was "a most beautiful species, worthy of general cultivation." Walther also collected it at the type locality about 1935, pictured² it in habitat and commented³ that "The species is really a most showy one, the silver-white leaves most effectively set off by intense red margins."

A few plants were grown in this country before the last war⁴ and Haselton published⁵ a photo of a plant in his collection, but later the species was apparently lost to cultivation. Several years ago Fritz Schwarz of San Luis Potosí collected it and sent a few plants to Robert Flores of Salinas, California, and to Dr. Morgan of Richmond, California. Vegetative propagation has proceeded slowly, but Mrs. H. O. Schutz of Richmond hand-pollinated her plant and numerous seedlings raised from her seed have been distributed by the International Succulent Institute. These showed no variation in shape or in degree of whiteness.

Echeveria subrigida will never be common in collections because it cannot be maintained in good appearance, or at all, unless it is given correct treatment. Some will consider this sufficient reason to avoid it, but many more will feel that successfully rearing a beautiful yet difficult plant is a most rewarding experience. This species can seldom be grown outdoors except in the most favored clime, for it is very sensitive to frost; in full sun the rosette also loses its fine form because the leaves usually become more erect and often dry back at the tip. Finally, rain or overhead watering will streak or wash away the powder. Yet plants need good light or they become greener and growth is spindly. They thrive best in a glasshouse with medium humidity and as close to the glass as possible. The best specimens I have seen were in the late Dr. Morgan's greenhouse, placed high on a shelf just under the whitewashed glass roof where the strong diffused light reddened the leaf-margins and produced a heavy coating of powder. It is also essential that plants be kept far out of reach of visitors, who are often compelled to finger the leaves to see if the powder rubs off; the resulting blemishes take weeks to disappear.

A suitable soil-mixture is rich but coarse, consisting of about two-thirds leafmold and one-third sand; fine-grained topsoil must be kept to a minimum or the roots and stem may rot. I have found plants to grow best when underpotted, for otherwise the soil takes too long to dry and the stem will then rot easily. A foot-wide plant seems quite happy in a five-inch pot, and if this

is nested within an empty pot of the next largest size it will be easier to maintain a correct rate of evaporation. I water only when the soil is nearly dry, though if delayed too long the leaves, being quite thin, will droop and turn brown. Naturally, no water should be allowed to touch the leaves or remain in the center of the plant, both to avoid rot and to protect the coating of powder. Mealy-bugs sometimes attack this species but fortunately do not multiply as badly as on some other *Echeverias*, and because of the loosely arranged leaves they can easily be removed by forceps or some other instrument. An insecticide completely removes the powder and I have yet to find one that will not burn *Echeverias*. Dead leaves should be kept pulled off (you will find that the sticky powder adheres annoyingly to your fingers) so that insects cannot accumulate and to improve the plant's appearance.

E. subrigida slowly forms a stem, and every year or two, when the stem becomes about four inches long, the rosette should be removed and rerooted. If this is neglected the plant becomes top-heavy, less attractive, and the rosette becomes smaller. After all dead leaves are removed the stem should be cut through an inch below the lowest leaf. Place the rosette over a small empty pot or on dry sand until roots have formed, then pot up. Watering the sand will not hasten rooting and may cause stem-rot. The stump should be placed next to the glass, where no moisture can fall on the cut surface, and not watered for two weeks or more. Then sparse watering will encourage the appearance of a few offsets which can eventually be removed and rooted. Established plants often produce offsets and these should also be removed when large enough, for a single, large rosette is of better appearance than a cluster of small, crowded ones. I have not heard of anyone growing plants from leaves, and they are probably too thin for this type of propagation. Seeds easily set if the flowers are hand-pollinated.

Perhaps I have over-stressed the difficulties of growing this species, for many of the fine specimens now grown in California receive rather different treatment than that suggested here. In any case it can be hoped that *Echeveria subrigida* will soon become widespread in our collections.

COLONIAL FLORAS

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1. Bull. N. Y. Bot. Gard. 3: 10, 1903.

2. Cact. Succ. Journ. Amer. 6: 139, 1935; 8: 19, 1936.

3. Cact. Succ. Journ. Amer. 6: 163, 1935.

4. Cact. Succ. Journ. Amer. 8: 20, 1936.

5. Cact. Succ. Journ. Amer. 17: 83, 1945.

CULTIVATED AND NATIVE AGAVES IN THE SOUTHWESTERN UNITED STATES

AUGUST J. BREITUNG

PART 1

Beginning in 1954, the writer has studied the genus *Agave* in field, herbarium, library and under cultivation. Field trips extended to Arizona, Nevada, Utah and some 25 miles beyond the International boundary into Baja California. Consequently, the photographs reproduced in the following pages, all made by the writer, are largely restricted to species under cultivation in southern California.

The genus *Agave* (Family Amaryllidaceae) appropriately meaning "noble" was first described by Linnaeus in 1753. The first species of *Agave* known to science is *Agave americana* described by Linnaeus in 1753.

The genus is distinguished by having flowering stems from a more or less woody caudex or a short, erect rootstock; leaves succulent, numerous, imbricate, forming a basal rosette; scapes tall and stout, ending in an elongated bracted raceme (subgenus *Littaea* Tagliab.) or panicle (subgenus *Euagave* Baker); flowers numerous with tubular or funnel-form perianth and thick-walled many-seeded capsules. After flowering, the rosette and flower stalk dies in nearly all species but in *Agave parviflora*, the rosette persists.

In the United States, the species of *Agave* are colloquially known as "century plants" because of the erroneous belief that the plants only flowered when they had attained an age of a hundred years. This belief is probably based on the fact that in cultivation many species rarely bloom. In this paper the botanical names only are cited. Under favorable conditions, the life cycle of an *Agave* plant is 10 to 12 years.

Indigenous to North America, the genus *Agave* is widely distributed, ranging from Utah in the north to Central America and the West Indies in the south with the center of population in Central Mexico. No attempt is here made to indicate the number of *Agave* species. Owing to the morphological variability exhibited by various species, numerous forms have been described as distinct species. Consequently, the number of *Agave* species, in the broad sense is probably considerably less than previously believed. However, occasionally new species are being described adding to the total number known.

In hardness they range from tender tropical species in the West Indies and Central America to those withstanding subzero temperatures occurring on the high plateaus of Mexico and the more northern latitudes of the United States. Owing to their tender tropical nature, few, if any of the *Agave* species native to the West Indies are cultivated in California.

Agaves have an aesthetic value which cannot be measured. No other group furnishes such a variety of decorative plants.

They range in size from *Agave pumila*, only a few inches across and weighing less than a pound, to the massive *Agave atrovirens* weighing more than a ton. Agaves have long been prized for ornamental planting in conservatories, formal gardens, lawns, terraces and rock gardens. Their varied shape and other attractive features make them especially valuable for this purpose. Agaves, like palms, serve to advertise a mild climate. The opportunity to observe the rapid growth of the tall flower stalks and opening of the numerous flowers is a further reward for raising an *Agave* plant to maturity.

Agave plants propagate by seeds, vegetative offsets or suckers and bulbils in the inflorescence. Depending upon the species, certain ones propagate by seeds only, others by seeds and offsets, while still others may propagate by all three methods.

Much has already been written on the economic products of *Agave* plants. Briefly their utilization includes: food, drink, soap, clothing, rope and other fibers, needles and thread, paper, glue, weapons, military instruments, medicines, red coloring matter, forage and ornamental and hedge plants. It has been stated that Agaves were outranked only by maize and potatoes by the early Aztec, Maya and other Indians of Mexico.

To stimulate greater interest and become better acquainted with the nomenclature of this magnificent group of plants, the writer has photographed all the species, varieties and forms

known to him. They are reproduced in the following illustrations which include brief descriptions, notes accompany each photograph indicating locality where photographed, cultivator, etc.

The writer wishes to extend his sincere thanks and appreciation to the many persons who granted permission and cooperated in obtaining these photographs. Comments, suggestions and correspondence is invited: Mr. August Breitung, 1416 S. Glendale Ave., Glendale, Calif.

AGAVE

The genus is divided into two natural subgenera; *Littaea*, having a spicate inflorescence and *Euagave* having a branched inflorescence. In this treatise approximately 50 entities are recorded for the *Littaea* and 60 entities in the *Euagave*. In addition, unidentified species are recorded in the appendix, some of which are probably new and undescribed species of *Agave*.

1. Subgenus LITTAEA; Flowers in spikes or spicate clusters.

Agave polyacantha Jacobi

A. multiflora Todaro

Distribution: Veracruz; type cultivated in Europe, from an unspecified source about 1800.

Leaves green though transiently glaucous, 5 to 15 cm. wide, 25 to 60 or 100 cm. long, with dark firm spine 2 to 3 mm. wide and 15 mm. long, rather small close-set brown teeth 3 to 5 or 10 mm. apart and 2 to 3 mm. long; spike sometimes budding at tip and base.



FIG. 19

Agave polyacantha Jacobi. Grown by H. S. Gentry, Murrieta, California

Agave xalapensis Roezl ex Jacobi

Distribution: Veracruz; above Cruz Verde, Las Vigas; type cultivated in Europe, from unrecorded locality.

Rosette single or with few offsets; leaves green or glaucous, 5 to 12 cm. wide, 25 to 75 cm. long with dark firm brown spine 3 to 5 mm. wide and 5 to 30 mm. long, red or blackish strong flat teeth 5 to 7 mm. apart and 5 mm. long.

Agave macrantha Todaro

Distribution: Mexico; type cultivated in Europe without citation of locality.

Rosette single or often mound-forming by numerous offsets; leaves spatulate-ovate, uncurved, glaucous, as much as 10 cm. wide and 30 to 50 cm. long with chestnut spine 8 mm. wide and 20 to 30 mm. long, firm brown teeth 6 to 15 mm. apart and 2 to 3 mm. long; flowers June-July.

Agave micracantha Salm-Dyck

A. oblongata Jacobi

A. cbloracantha Salm-Dyck

A. mitis Salm-Dyck

Distribution: Hidalgo or Veracruz?; type cultivated in Europe from an unrecorded locality.

Leaves gray-green, 8 to 12 cm. wide, 40 to 60 cm. long, with slender weak spine and small close-set dark teeth, these are sometimes almost suppressed.



FIG. 20

Agave micracantha Salm-Dyck. Grown by L. Ellenwood, San Fernando, California

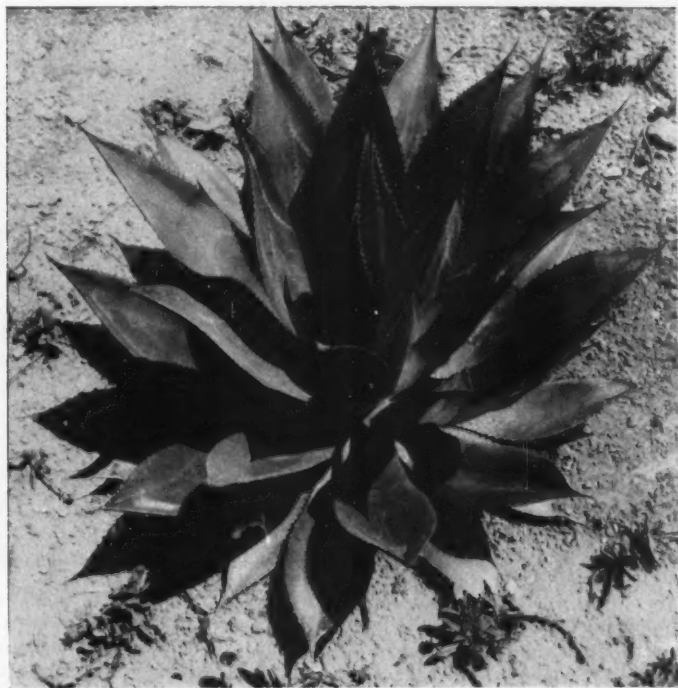


FIG. 21

Agave xalapensis Roehl ex Jacobi. Grown in the Huntington Botanical Garden, San Marino, California

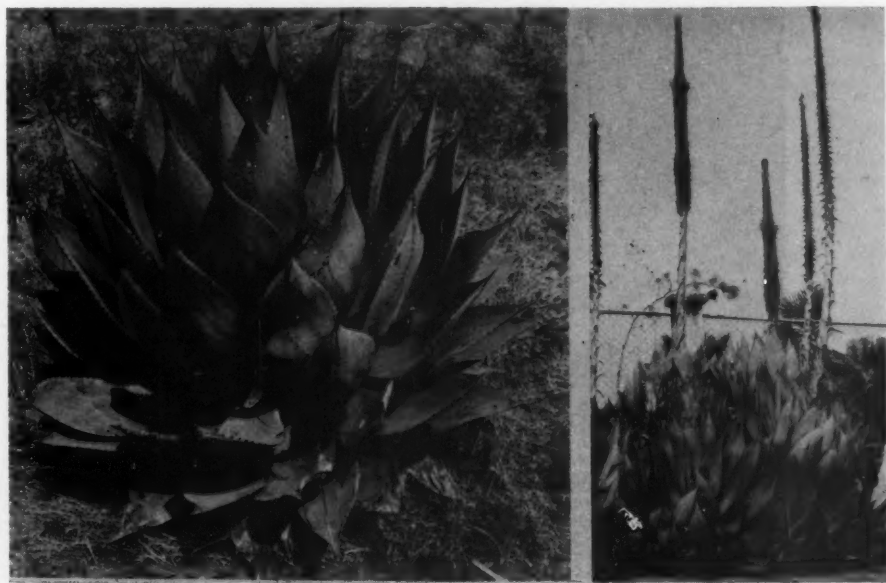
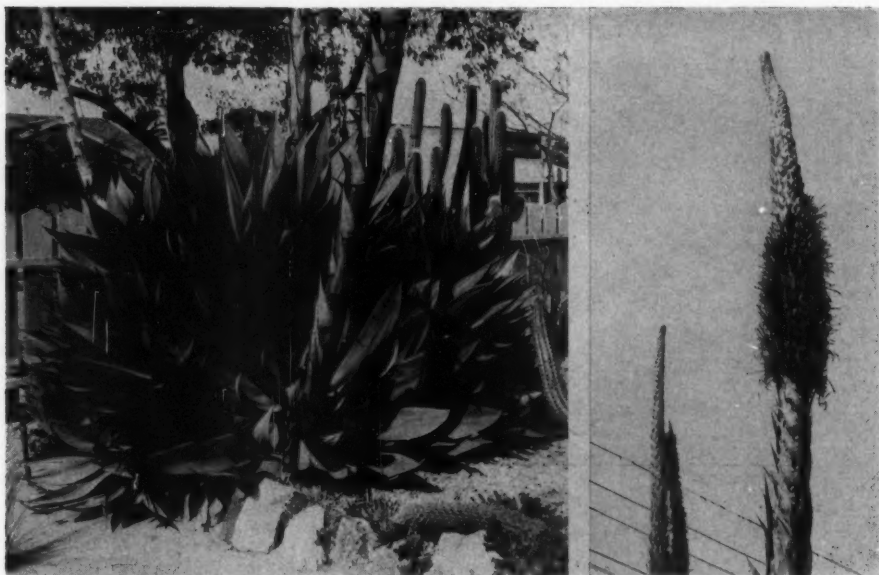


FIG. 22

Agave macrantha Todaro. Grown in the Huntington Botanical Garden, San Marino, California



Agave micracantha Salm-Dyck. Grown by G. H. Tegelberg, Inglewood, California

***Agave albicans* Jacobi**

A. celsii Hooker

Distribution: San Luis Potosi; type cultivated in Europe from an unrecorded locality.

Leaves glaucous, 10 cm. wide, 30 to 40 cm. long; spine slender, weak, 1 mm. wide and 5 to 10 mm. long; teeth brown-tipped, very irregular, close-set or confluent, 5 to 10 mm. apart, 2 to 3 mm. long. Flowering in May.



Agave albicans Jacobi. Grown by L. Ellenwood, San Fernando, California

QUESTIONS and ANSWERS

Conducted by
HARRY JOHNSON
Paramount, Calif.



Question: I have had fairly good luck in sowing seed but sometimes I have gotten poor germination. Sometimes too, the seed germinates quickly but eventually the seedlings cease growing and shrivel, these are mostly the tall growing cereus group. Succulents I seem to lose at once for many times they seem to melt away almost overnight. Can you tell me what I am doing wrong.

L. C. HILL, N. Y.

Answer: In most cases cactus seeds germinate rather easily and quickly. However they do not all respond to exactly the same treatment and some are just plain balky. Ordinarily one has better results in sprouting seeds at lower rather than higher temperatures within the temperature range for a particular group of cacti. Thus if the range is between 75° and 85° you would get stronger and easier to manage plants below 80° though they might not come up as quickly. Much depends also on light and humidity. I have used innumerable types of compost for seed pans or flats and most have proved satisfactory. Any good compost that does not pack too hard is suitable. The pH should be about neutral. Firm the soil down and flatten it. I generally then sift about an eighth inch of compost through an eighth inch sieve over the surface and flatten it down. Sow the seed not too thickly over the surface. Press the seed in with a flat board. I cover my seed with washed, sterilized, coarse sand to about an eighth of an inch. In very hot dry regions I have seen almost a quarter inch covering used with good results.

The pan or flat should now be set in water and allowed to soak until moisture shows on the surface. A night temperature of 70° to 75° is about right for most things. I find it best to place a pane of glass over the pot until germination commences which means you must inspect them every day. As the seeds germinate tilt the glass up to allow some air. A label at one corner is enough until germination is completed. Keep the seed wet. I may spray them every day in dry weather. After full germination tilt the glass 2° or remove it. The reason your cereus seedlings fall over and shrivel is probably because they were germinated at a high temperature or not given enough air. When they grow too quickly at the beginning the roots do not keep up and

the plants never really get their roots down.

Very fine seed such as *Parodia* and some *Rebutias* and *Notocactus* take a long time to grow large enough to see. They are best kept damp for a long time. It may be months before they are big enough to handle.

Some of the balky seeds may come up almost 100% at one sowing and perhaps 5% at another. I have never pinned down the exact reason though there are many theories. A friend worked on celery seed germination for field planting. After many trials he found that if the seed was kept wet and chilled for nine days it could be sown with fine germination if each 12 hours the temperature was brought up several degrees. Fairly simple but difficult to discover!

Succulent seed of course is very variable as so many plant families are involved. Larger seeds as *Aloes*, *Agaves*, *Haworthias*, *Dyckias* etc., come up well at between 60% and 70%. Fine seed should have a good seed bed to germinate on. Some use finely sifted sphagnum moss with good results. The compost should be spongy. The little plants have a rough time if the compost is too coarse or even too sandy or hard. Some seed is as fine as dust and if covered the layer should be very thin. A glass covered propagating frame is excellent if the airing is closely watched. 70° at night for *Mesembryanthemum* seems to suit many kinds as *Dinteranthus*, *Lithops*, *Lapidaria*, *Gibbaeum*, etc. I have also done well with them at 60%. They have to be very carefully watched as regards air as one or two days of too close an atmosphere may draw them past saving. This is generally what happens. *Crassulas* I would rather germinate at 60° at night as in too high temperatures they may damp off. If damp starts it is hard to control.

As to how long it takes to put size on a seedling generally an inch in diameter plant is about 2 years. Some flower in 2 years others 3 to 5 years. Some may take 10 years or more. Succulents are more variable but most when a year old are big enough to handle and at 2 years may flower. The tree-like kinds of course require much longer.

MR. AND MRS. CLUB

The Cactus Club of the Tampa Bay area in Florida, met at the Tampa Electric Co. Leisure House with Mr. R. E. Pinnell as speaker. He showed slides of his recent trip to Mexico and told of the many uses of cacti and the other succulents: food, jellies, jams, syrup, medicinal purposes, alcoholic drinks, fences, and fibers for rope and cloth. He brought samples of the jams, jellies, syrup, candy, etc. which were very good. He also had a beautiful luncheon cloth made of the fibers. Mr. Pinnell's trips are sponsored by colleges and Botanical Gardens.

E. R. CARTER, *Affiliate Reporter*
206 South St., Tampa, Florida

FURTHER NOTES ON ECHEVERIA

By ERIC WALTHER

Research Associate, Department of Botany, California Academy of Sciences

PART VI

127. *Echeveria megacalyx* sp. nov.

"Pertinens Ser. *Racemosae*; glabra, acaulescens, rosulis simplicibus vel surculosis; foliis numerosis, tenuibus, 8-10 cm. longis, ad 30 mm. latis, mucronatis, griseis, nec papillois; scapis ad 45 cm. altis, aequilateralibus, subspicatis, valde erectis vel scorpioidibus ante anthesin, 30-floribus; bracteis foliis similibus; pedicellis brevissimis, bibracteolatis; sepalis saepe magnis, corolla paulum brevioribus, adpressis vel adscendentibus; corollis 10 mm. longis, luteis; carpellis viridibus; nectariis albidis."

Holotype: Th. MacDougall #B-187, (UCBG 58.738) (UC).

Occurrence: Mexico, Oaxaca. San Juan Mixtepec, Neveria, ca. 10,000 ft., on rocks in partial shade in pine-forest. T. MacDougall #B-197 is the same, from San Juan Ozolotepec (—UCBG 58.826).

Description: (Of original plant cultivated at Golden Gate Park, 1937).

Plant glabrous, not papillose; stem short, in age emitting offshoots at base; roots fibrous, neither fleshy nor fusiform-thickened; leaves numerous, densely rosulate, thin, nearly flat, oblong-spathulate, up- or recurved, to 10 cm. long and 25 mm. broad, shortly aristate-mucronate, epidermis faintly punctate, margins often lacerate when young; inflorescence equilateral, subspicate, at times strongly nodding or scorpioid at apex, to 45 cm. tall; peduncle erect or ascending, to over 8 mm. thick at base; lower bracts obovate, to 3 cm. long, spreading, not readily detached; flowers to 30 or more; upper bracts 10 mm. long, 6 mm. broad; uppermost pedicels very short, lowermost 3 to 8 mm. long, their 2 oblanceolate bractlets to 10 mm. long; sepals often large, leaf-like, from $\frac{2}{3}$ to as long as corolla, but often smaller, somewhat spreading, obovate-elliptic, acute, subequal, 8 to 10 mm. long, to 6 mm. broad; corolla urceolate, to 8 mm. long, 5 to 8 mm. in diameter at tips of the outcurved petals; petals thin, with shallow basal hollow; carpels ca. 6 mm. long, ridged on face; stamens longer than carpels, nearly as long as petals; styles obliquely capitate; nectaries thin, narrowly-lunate, to 1.5 mm. wide. Fls. VII-X.

Color: Leaves grass-green to dark-bluish-glaucous; peduncle apple-green, bracts and sepals as leaves; corolla dull-green-yellow; carpels

spinach-green; nectaries yellowish to white.

Remarks: In the Series *Racemosae* this new species stands out by reason of its rather short pedicels, slightly spreading sepals and greenish-yellow corolla. The greyish leaves are reminis-

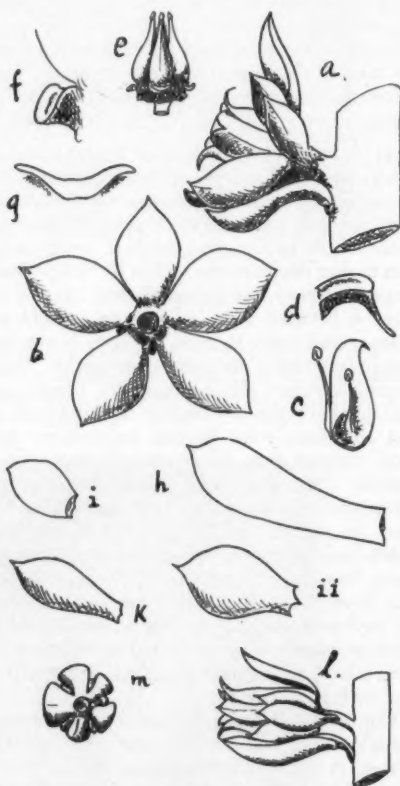


FIG. 25

Echeveria megacalyx

- a. side-view of corolla x2
- b. base of calyx x2
- c. inside of petal x2
- d. petal-tip x8
- e. carpels x2
- f. nectary, front-view x8
- g. nectary, side-view x8
- h. leaf x0.4
- i. bract x0.4
- ii. upper bract x2
- k. bractlet x2
- l. side view of corolla, Cuernavaca x2
- m. base of calyx, Cuernavaca x2

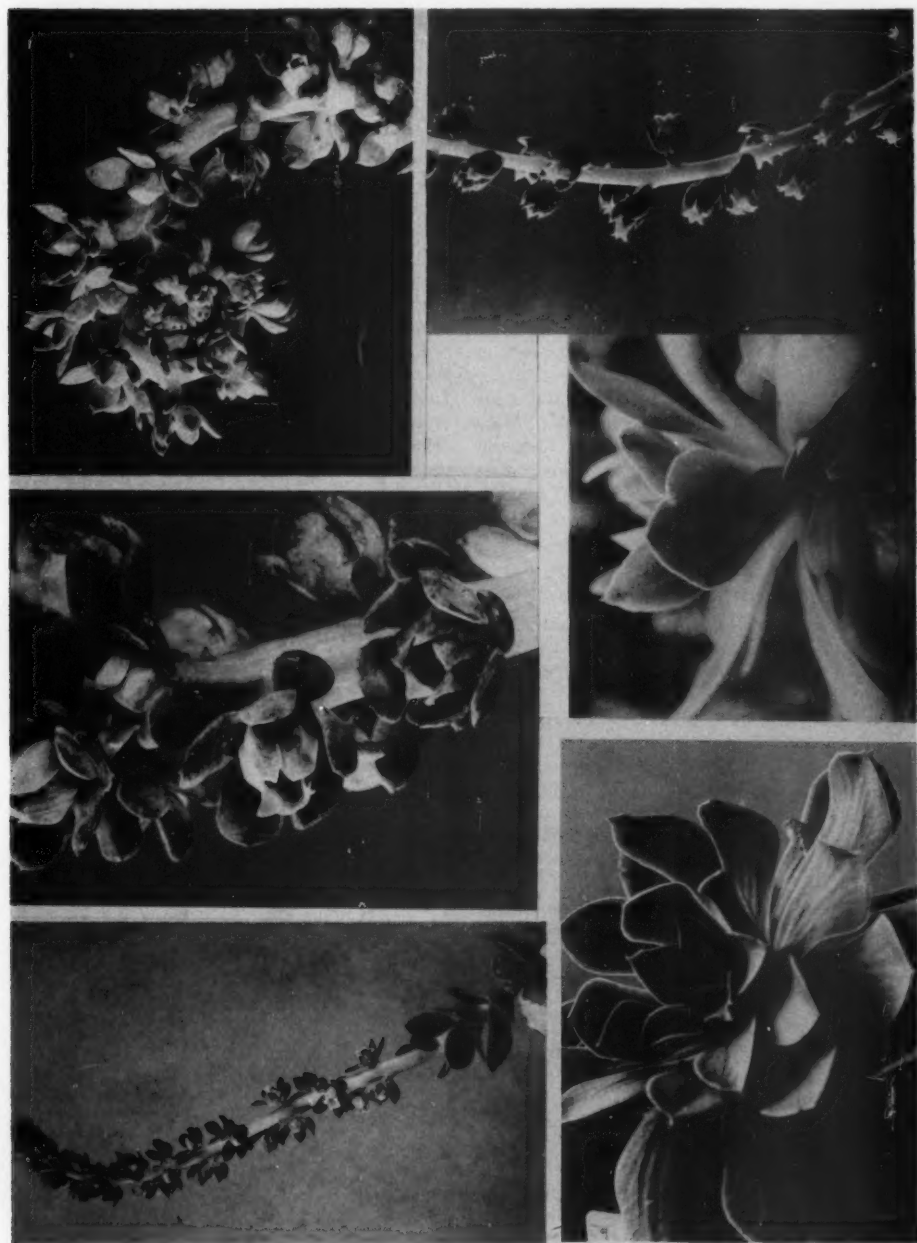


FIG. 26

Echeveria megacalyx

1. Upper left: flower-spike, Golden Gate Park.
2. Upper center: flowers, Golden Gate Park
3. Upper right: scorpioid top of flower-spike.
4. Lower left: foliage, Cuernavaca.
5. Lower center: foliage, UCBG. 1958.
6. Lower right: flowers in Cuernavaca, 1937.

cent of those in *E. eurychlamys* from Peru, but in that they are turgid, the sepals are spreading, the upper bracts broader, nearly orbicular, and the corolla is red. The clearly fibrous roots prevent placing this in the Series *Mucronatae*, where these are always fleshy-fusiform.

We first met with this distinct species in Cuernavaca, the garden of C. Halbinger, who had obtained this through Sr. O. Nagel, without any definite locality. When brought home to San Francisco, the same plant flowered again, but changed considerably, no doubt in response to the quite different climate in the greenhouse of Golden Gate Park. Loss of the type-material prevented us from publishing this interesting item at that time, and its recent rediscovery in Oaxaca, by Mr. Thomas MacDougall, was most welcome. Of the locality, *Neveria*, Mr. MacDougall states "No habitations here; formerly natural ice was harvested here and packed down to surrounding towns. The 'canoas', (wooden troughs) in which the ice formed; are still to be seen."

41. *Echeveria juarezensis* sp. nov.

"Pertinens Ser. *Retusae*; glabra, caulescens; foliis rosulatis, obovato-cuneatis, supra concavis, usque ad 5 cm. longis et 3 cm. latis, acutis; inflorescentiis ad 20 cm. altis; bracteis ad 25 mm. longis, 11 mm. latis, oblongo-obovatis, concavis, acutis; pedicellis ad 14 mm. longis; sepalis subaequalibus, ad 11 mm. longis, patentibus; corollis pentagonalibus, 12 mm. longis, coccineis; nectariis obliquis, reniformibus."

Holotype: CAS-409864, T. MacDougall #B-72; *Isotype*: UC.; *Clonotype*: University of California Botanic Garden, 56.791.

Occurrence: Mexico. Oaxaca. Sierra de Juarez, Ixtepeji, Ixtlan de Juarez. At present known only from preceding type-locality.

Description: (Of living plant cultivated at UCBG, 1958.)

Plant glabrous; caulescent with stem to 8 cm. tall, usually simple; leaves to 20 or more, crowded in terminal rosettes, obovate-cuneate, acute and mucronate, thick and rigid, deeply concave above, beneath rounded and somewhat keeled, 5 cm. long and 3 cm. broad; inflorescences 2, axillary, of 3 secund racemes, to 20 cm. tall; peduncle erect or ascending, to 5 mm. thick near base; lower bracts ascending, oblong-obovate, upcurved, concave above, rounded beneath, at the upcurved apex mucronate, to 25 mm. long and 11 mm. broad; racemes 10 to 12 cm. long, ascending-spreading, with about 12 flowers each; upper bracts as the lower, but 15 mm. long; pedicels slender, to 14 mm. long; sepals ascending to widely spreading at anthesis, subequal, longest 11 mm. long, linear-oblancoate,

acute, convex on both surfaces; corolla pentagonal, conoid-urceolate, to 12 mm. long, 8 mm. in basal diameter; petals apiculate, with distinct basal nectar-cavity; carpels 7 mm. long; nectaries oblique, reniform, to 2 mm. wide. Fls. VI-VIII.

Color: Leaves cource-green to lettuce-green, somewhat glaucous; peduncle eugenia-red, as are the pedicels; bracts as leaves but above eugenia-red, glaucous, with edges pomegranate-purple, upper bracts buffy-citrine; sepals light-hellebore-green tinged corinthian-red; corolla scarlet; petals light-orange-yellow inside; carpels white below, viridine-yellow above; styles ox-blood-red.

Remarks: With the discovery, and introduction, of a growing number of *Echeveria*-species from Mexico, it may become more difficult to clearly delimit closely related species, but on the other hand we obtain a much clearer picture of the organization of the genus as a whole, its probable evolutionary lines, etc. *Echeveria scheerii*, for instance, only quite recently rediscovered in Oaxaca by Mr. MacDougall, formerly was quite isolated without any close relations being known. However, with the present novelty it constitutes a clear-cut pair. Cultivated plants of *E. scheerii*, growing at the Strybing Arboretum in Golden Gate Park, S. F., differ in their larger size, larger, somewhat undulate leaves, and their much larger corolla. The latter may be as much as 25 mm. long and bittersweet-orange in color.

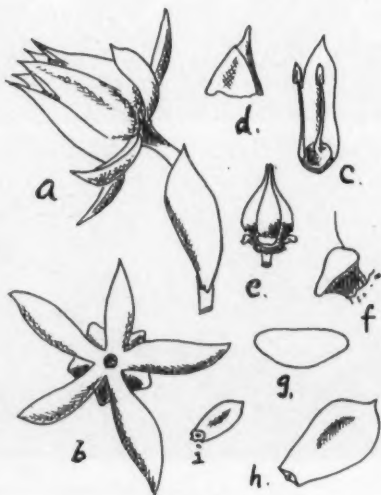


FIG. 27

Echeveria juarezensis

- | | |
|-----------------------------|----------------------------|
| a. side-view of corolla x 2 | f. nectary, front-view x 8 |
| b. base of calyx x 2 | g. nectary, side-view x 8 |
| c. inside of petal x 2 | h. leaf x 0.4 |
| d. petal-tip x 8 | i. bract x 0.4 |
| e. carpels x 2 | |

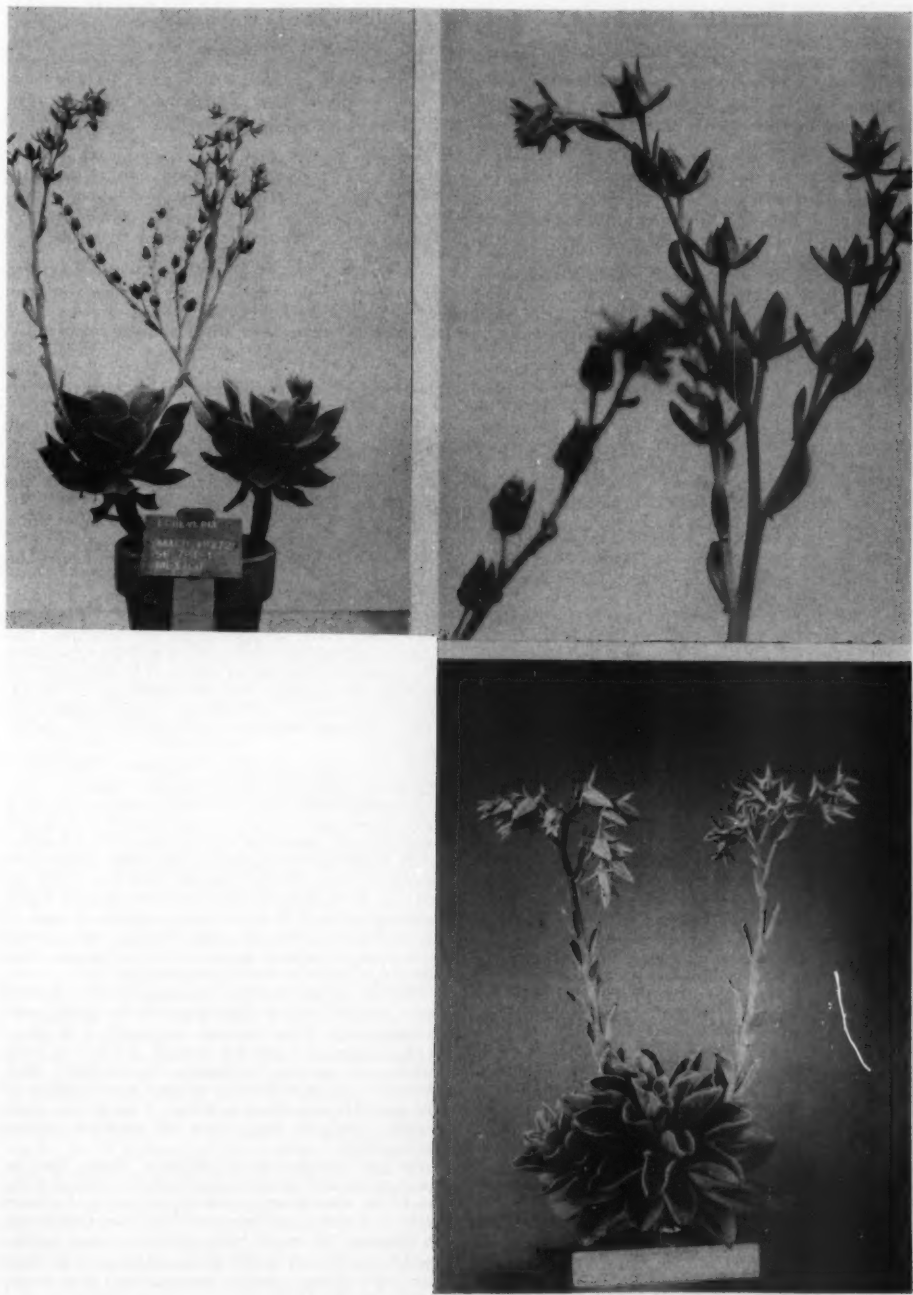


FIG. 28

Echeveria juarezensis. Left, in flower at the University of California Botanic Garden; upper right, flowers of latter; lower right, *Echeveria scheerii*, flowering plant.

MARCH-APRIL 1959 OFFERING OF PLANTS BY THE INTERNATIONAL SUCCULENT INSTITUTE, INC.

Please address all communications to the Secretary, J. W. Dodson,
921 Murchison Dr., Millbrae, Calif.

ISI-40 *Kalanchoe manginii* Hamet & Perrier de la Bathie. An excellent basket plant resembling *K. gracilipes*, with pendent, succulent-leaved stems and interesting large red flowers in early spring. Numerous plantlets form on the old inflorescence and these can be removed for propagation. To maintain compact growth prune back after flowering. Imported by Dr. M. Morgan from Madagascar, where this clone was collected near Itremo. \$1.00

ISI-105 *Sedum greggii* Hems. This species is seldom available and then is almost always misidentified as *S. diversifolium*. In spring *S. greggii* forms dense mats of tiny chartreuse rosettes resembling miniature pine-cones. At this stage it has a highly charming appearance and is valuable for dish-gardens or planters. In summer the stems elongate and flower. These stems should be carefully pruned away in fall to expose the new rosettes. UCBG 52.175, locality and collector unknown, determined in 1958 as *S. greggii* by Dr. Robert Clauson. Native to central Mexico. \$.75

ISI-126 *Frailea colombiana* (Werd.) Back. One of the few globular cacti from Colombia, this is a very pretty golden-spined species slowly forming clumps of heads to 2 inches wide, and with small yellow flowers which usually set seed. This has seldom been offered and is recommended for collections confined to a small space. Seedlings grown from a plant of UCBG 54.1047, which was grown from seed from the Berlin Botanical Garden. \$1.00

ISI-155 *Villadia batesii* (Hems.) Baehni & Mach. A rare member of the *Crassulaceae*, *Sedum*-like in appearance, with pink buds, white petals and reddish tipped, bright green leaves. It makes a highly satisfactory ground-cover in frostless areas. UCBG 54.170, collected by E. Walther on north slopes of Nevado de Toluca, 1400' alt., state of Mexico, Mexico, along road to the summit. See photo in this journal, July-Aug. 1955, pg. 114. \$.75

ISI-168 *Echeveria halbingeri* Walther. One of the finest introductions in years, this will soon become popular and much in demand. The tiny, inch-and-a-half rosettes are the ultimate in symmetry and daintiness, the closely set leaves being nearly white, and dense clumps slowly form. This should be an excellent dish-garden plant or one to grow between rocks. Does well outside in California, but as a greenhouse plant should be given strong light and moderate watering. See photo in this Journal, May-June 1958, pg. 89. UCBG 57.796, from C. Halbinger of Mexico, collected near Paila, Hidalgo, Mexico. \$1.50

ISI-240 *Orostachys japonicus* (Max.) Berger. A most peculiar species of *Crassulaceae* resembling a small *Dudleya* in the growing season, with narrow bluish green leaves and dense spires of white flowers. In winter these leaves disappear, leaving in the center a dormant, symmetrical rosette formed of minute overlapping, horny-tipped leaves. UCBG 56.332, collected by Reid Moran (#5416) at Odamari, Kagoshima-ken, Japan. \$1.00

ISI-248 *Epiphyllum pittieri* (Web.) Britt. & Rose. Similar to *E. strictum*, but with smaller, more numerous flowers. As always in this genus, the flowers are nocturnal and white. UCBG 52.1082, collected by C. H. Lankester at Turrialba, Costa Rica, 2500' alt. \$1.25

ISI-253 *Crassula abyssinica* Rich. Sometimes listed as a synonym of *C. alba* Forsk., this is a species widely distributed through central-Africa. Its narrow, ciliate leaves form stemless rosettes and its flowers are white

to red. UCBG 53.569, received from P. R. O. Bally of Kenya, collected at Ngong, near Nairobi, Kenya, Africa. \$.75

ISI-265 *Yucca whipplei* var. *caespitosa* Jones. Unlike the type variety, this has smaller inflorescences and forms large clusters which live many years. UCBG 57.046, collected by H. J. Arnott (#67c) in 1955, 6 miles west of junction of Highway 6 and the road to Angels Crest, Los Angeles Co., Calif. \$1.00

ISI-266 *Yucca whipplei* Torr. var. *whipplei*. The type variety of this species forms a single rosette of stiff, bluish white leaves. When about 5 years old it produces an inflorescence which is the most beautiful of any *Yucca* and which may become 15 feet tall. Unlike all other species it does not offset and dies after flowering. An outstanding plant for a rockery, where it will withstand considerable frost. UCBG 57.045, collected by H. J. Arnott (#15) in 1955 near Mt. Helix, east of La Mesa, San Diego Co., Calif. \$1.00

ISI-267 *Yucca whipplei* var. *intermedia* (Haines) Webber. Similar to var. *caespitosa*, but forming smaller clusters and fewer inflorescences. UCBG 57.047, collected by H. J. Arnott (#84) in 1955, 3 miles below Seymour Camp on the road to Seymour Camp from the main road through Frazer Park, Ventura Co., Calif. \$1.00

ISI-268 *Echeveria viridissima* Walther. A highly attractive species especially suited for landscaping. Leaves deep green turning a bright red in summer sunlight and giving the whole plant a striking appearance. The flowers are also of an unusually brilliant red. See photo in this Journal, Jan.-Feb. 1959, pg. 22. UCBG 56.805 (clonotype), collected by T. MacDougall (#B-134) at S. Pedro Mixtepec, Guish-gal, Mexico, 10,000' alt. \$1.50

ISI-269 *Echeveria affinis* Walther. The "Black Echeveria" attracts attention whenever seen, for when it is grown rather dry in a sunny location its thick, dense leaves are a deep, brownish black. A real curiosity, and very handsome when topped with a flat cluster of bright red flowers. This collection differs from that of the type (see this Journal, July-Aug. 1958, pg. 105) in its blacker, slightly differently shaped leaves. Collected by R. J. Taylor under bushes and trees on the road between Mazatlan and Durango, Mexico. The surrounding country is mountainous, the altitude about 5000 ft., with rains even in summer. \$1.50

ISI-270 *Graptopetalum macdougallii* Alex. A much easier species to grow than many of this genus, soon forming a mat of bluish white rosettes which in spring produce many red-petalled flowers. UCBG 51.1310, locality and collector unknown, but probably MacDougall's collection from near the Chontal village of Tenango, Oaxaca, Mexico, where it grows on rocks, forming small to large mats of attractive, silvery rosettes. \$.75

ISI-271 *Dudleya viscida* (Wats.) Moran. This interesting species, formerly classified as a *Strylophyllum*, has sticky, olive-green, pencil-shaped leaves. Collected by M. E. Quesada 2 miles east of San Juan Hot Springs, on Highway 74 at border between Riverside County and Orange County, Calif. These plants grew on sheer rock cliffs facing north at the narrowest part of the mountain pass. \$1.00

ISI-273 *Dudleya caespitosa* (Haw.) Britt. & Rose. A dwarfed, compact species for the rockery or pot culture. This plant is found along coastal central California, and still grows wild on Twin Peaks in the heart of

residential San Francisco. The plants offered here were collected on Twin Peaks by T. Juul; two forms occur there, a white-powdered one on the west side and a green, non-farinose one on the east side. The ISI would like to hear from those receiving these plants as to whether these forms remain different under their cultivation. This species prefers cool conditions, for it grows along the foggy coast. One plant of each will be sent, both for \$1.00.

ISI-274 *Haworthia parksiana* von Poelln. This is a gem of a *Haworthia*, available now for the first time. Its blackish, roughened leaves form remarkably tiny rosettes which offset but slowly, and an old plant can be retained in a three-inch pot. Collected by G. G. Smith (#6102) on hills near Great Brak River Village, George District, S. Africa. \$1.50.

ISI-275 *Haworthia reinwardtii* var. *peddiensis* Smith. Forming clustered columns to 6 inches high, the leaves beautifully banded with rows of white tubercles. A finely marked species for collections. Collected by G. G. Smith (#656) 12 miles east of Hunts Drift, Fish River, Peddie Division, Cape Province, South Africa. \$1.25.

ISI-276 *Stapelianthus montagnacii* (Boit.) Boit. & Bertr. This is by far the most attractive of the three species of this genus of stapeliads. It has creeping, red-marbled stems and rather large, expanded flowers of a glowing red color spotted with gold and long white hairs. It is also the easiest grown member of the genus and was but recently discovered in southern Madagascar. Our plants came from S. Rocha of Brazil, who in turn received them from France. \$1.25.

ISI-277 *Glottiphyllum oligocarpum* L. Bol. Most *Glottiphyllums* are rather rank, uninteresting plants, but this is a choice exception with dwarfed, compact leaves of a most peculiar, ashy, opalescent pink. Confined in small pots in bright sun with little water, this will become a favorite in your collection. Grown from seed artificially set on two plants of UCBG 49.1599, which were grown from seed from the University of Stellenbosch, S. Africa. \$1.50.

ISI-278 *Conophytum citrinum* L. Bol. One of the prettier species, with small bi-lobed leaf-pairs rimmed with red. The lemon-yellow flowers appear in fall. UCBG 52.1630, \$.75.

ISI-279 *Conophytum piriforme* L. Bol. Similar to *C. citrinum*, with yellow flowers. *Conophytums* rest in our summer, becoming hidden by the dried leaves, and begin growing in fall. UCBG 34.1524, \$.75.

ISI-280 *Aloe rigens* Bally & Reyn. A rather widespread *Aloe* in Somaliland, this new species is distinct in having large, stemless, green rosettes and pale scarlet flowers. For more information see Journ. S. Afr. Bot. 24: 177, 1958. The plants were grown from seed collected south of Bawn, Somaliland. \$1.25.

ISI-281 *Adenium obesum* Balf. *Adeniums* are probably the most beautiful-flowered succulents and are among those few, first-rank plants connoisseurs strive to obtain. They usually strive in vain for *Adeniums* because they are hardly ever obtainable; certainly none have been offered before in Europe or America. Belonging to the *Apocynaceae* (a family also containing *Vinca* and *Oleander*), *Adeniums* are succulent shrubs with a swollen, addily twisted trunk and thick branches, glossy leaves, and large white to purple flowers. *A. obesum* has bright red, 2-inch long, bell-shaped flowers with a white center and frilled petals. Plants two years old and more will often remain in bloom for eight months of the year if kept warm and moist, but in winter they should be kept rather dry and nearly leafless. Keep underpotted in loose, rich soil, water freely in summer, fertilize occasionally, and protect from frost. Cuttings are difficult to root and we have not succeeded in setting seed by cross-pollinating clones, so these plants

will always remain rare. We offer a limited number of 2-year-old seedlings from seed sent by A. Delap of Thika, Kenya, E. Africa; this seed is from his cultivated plant, which was originally collected at Rumuruti, Kenya. The identity of this plant is still uncertain but it is either *A. obesum* or a close ally. UCBG 57.102, \$2.50.

ISI-282 *Echinopsis torrecillasensis* Card. Quite untypical of *Echinopsis*, this new, potentially popular, miniature species more closely resembles a *Rebutia*. In cultivation the nearly spineless, dark green stems form many-headed clusters, the offsets rooting on the plant and easily falling off. The flowers are about 3 inches long and salmon-red. UCBG 56.012, collected by M. Cardenas, Dec. 1955, locality unknown. See this Journal, July-Aug. 1956, pg. 110, for further information. \$1.50.

ISI-283 *Opuntia pentlandii* S.-D. Sometimes classified as a *Tephrocactus*, this forms masses of small egg-shaped, nearly spineless, bluish green stems. Very hardy, and best planted among rocks in an outdoor garden. UCBG 37.1052, collected by James West (#8228) near Villazon, Dept. Tarija, Bolivia, Feb. 1937, on high, arid, open or brush plains, 3300-4000 m. alt. The species varied in spination and was the most predominant *Opuntia* in that area. \$1.00.

ISI-284 *Opuntia floccosa* var. *denudata* Weber. *O. floccosa* is a famous alpine plant of Peru, where its white-woolly stems grow into low masses resembling snow-drifts. This variety is nearly or completely hairless and is apparently identical with *O. atroviridis* Back. Grows well when grafted on *Trichocereus spachianus*, but is perfectly hardy and happy on its own roots outdoors. Protect from sunburn and hot summers. UCBG 52.775, collected by P. C. Hutchison (#668) 2 miles west of Oroya, Dept. Junin, Peru, April 1952, 3800 m. alt., growing intermixed with typical *O. floccosa* and intermediate forms. \$1.00.

ISI-286 *Haworthia armstrongii* von Poelln. A rigidly upright species remarkable for its bluish coloring. It is rare even at its type locality, near the summit of hills overlooking the springs near Uitenhage, S. Africa, where it is restricted to a small area near that town. J. R. Brown (#494), collected by W. E. Armstrong after whom it was named. See photo in this Journal, Feb. 1939, pg. 123. \$1.25.

ISI-287 *Dudleya edulis* (Nutt.) Moran. Another former *Stylophyllum*, differing from *D. viscidula* in its whitish non-sticky leaves, and is an excellent plant for a rock-garden. These plants formed large clumps on cliff-edges facing the ocean where they are exposed to fog and wind. Collected by G. Quesada, 1/4 mile west of Cabrillo, near Point Loma, Pacific Palisades, San Diego Co., Calif. \$1.00.

We have on hand, a number of the plants offered in the Sept.-Oct. 1958 issue of this Journal. If interested in securing any of these, please send orders only. The I.S.I. will advise you the amount to remit, according to what is available. There are a few plants of *Escheveria subrigida* still available at \$1.50; the supply is very limited.

NEW MEXICO CACTUS AND SUCCULENT SOCIETY

Society members in the vicinity of Albuquerque, New Mexico, are invited to join this active group. Contact the Secretary, Mary J. Abrams, 3218 Morningside NE, Albuquerque, New Mexico.

IMPORTATION LIMITATIONS

As of Nov. 12, 1958 the size of imported cacti cannot exceed 12 inches in height. U. S. Dept. of Agriculture, Plant Quarantine Division, Nogales, Arizona.

WANTED: *Cephalocereus leucocephalus*, preferably blooming size. A. H. Huntman, Box 687, Oakridge, Oregon.



FIG. 29

Upper left: Volcan de Fuego as seen from Alotenango. *Disocactus biformis* occurs in the jungles at its base, near the rim of the two lava streams pictured at center and right, flowing in the Barranca Honda and Rio Las Lajas. Upper right: After three days of continuous search I finally had my "trophy", *D. biformis*. Lower left: "Lava Bombs" and volcanic sand drifts in Barranca Honda, the site of ancient Aguacatepéque. Above the burned forests in the background are the slopes of Volcan de Fuego. Lower right: A silhouette photo of the largest specimen of *D. biformis* found. Photos by author.

The Rediscovery of *Disocactus biformis*

By CLARENCE K. HORICH

On the night of February 20, 1957, in southern Sacatepéquez, Guatemala, the giant Volcan de Fuego awoke to unleash his fury in violent eruptions of lava and ashes. Located at its base, the small town of Alotenango was threatened by lava streams that soon destroyed the cloud forests of the eastern slopes, and in Guatemala City plans were made to evacuate the town. However, the Volcano of Fire (as it would be known in English) was satisfied with this demonstration

of its powers, dormant since the year 1931, and grumbling and hissing it returned to slumber, wrapping itself in a thick cover of sulphuric haze.

Three weeks later, when I had the questionable privilege of visiting the volcano zone, its crest was still smoldering and the lava hardly cold. The fiery stream had turned south-east, touching a jungle area once known as Aguacatepéque. A prolonged eruption would have

burned this region into dust and thereby eliminated the only known locality of a cactus species collected here more than six decades ago.

Disocactus biformis, an epiphyte with small, purplish red flowers, was first collected at an unknown locality in Honduras, but since then it has not been found again in that country. I was commissioned by the University of California Botanical Garden (Berkeley) to recollect the species, for it seemed no longer to be in cultivation. Mr. Hutchison sent me data from a herbarium sheet of a specimen collected by J. D. Smith, in 1892, at the only locality known for this species: Aguacatepec, Department Zacatepéquez, Guatemala.

When I first tried to locate Aguacatepec on both old and new maps I failed as completely as I had when questioning dozens of truck drivers who regularly criss-cross the department of Zacatepéquez and who usually prove to be the best source of such information. Bringing back "lost" plants, animals, minerals and what-have-you is always an intriguing, difficult task. As in detective stories there is always a missing link somewhere, and usually it is the most essential one—the location itself! I well remembered the trouble encountered by George Wagner and myself in hunting down a lost orchid (*Maxillaria sanderiana*) in eastern Ecuador, and I knew in advance it would be the same problem with *Disocactus biformis*: First find Aguacatepec and then there would be a probability of finding the plant—providing civilization hadn't moved in too far, for 65 years is quite a span of time.

The Dirección General de Cartografía in Guatemala City became the third negative source of information:

"Sorry, we've checked all the maps we have and there is no such place as Aguacatepec in the Department of Zacatepéquez. However, you could try the head office of statistics, as they have all habitations listed, including the smallest, most unimportant peasant shacks."

And finally I did find the answer to my riddle. There it was, in the 1950 civil register: "Canton de Alotenango: Finca Aguacatepéque; population, 3." So that was the reason nobody had heard of the place. A locality inhabited by a Cakchiquel Indian couple and their child was sure to escape even the most elaborate attention!

On March 7th I was in Antigua, waiting my turn to catch one of the few busses that occasionally travel south, via Ciudad Vieja, to Alotenango. Here I was delayed again by vainly questioning the natives about Finca Aguacatepéque until at last one Indian told me it was about 6 km. south of Alotenango, somewhere around Barranca Honda or La Reunión, near the department boundary. At this moment an Escuintla-

bound truck rolled by, and luck was with me in that the driver's grandparents, had, many decades ago, lived in Aguacatepéque, which then had been a village.

According to the driver, Aguacatepéque had, at the beginning of the century, been abandoned because disease had attacked the village; most of the inhabitants had found a new home either on the Volcan de Agua or in Ciudad Vieja, and had finally settled in Alotenango. Since then the jungle had covered the site of ancient Aguacatepéque, now inhabited only by the Indian family.

About 5 km. south of Alotenango we stopped, facing the volcano's broad lava-stream to the west.

"The site of old Aguacatepéque begins here," I was told, "and it stretches to the south-west for about 6 km. What is now known by this name can be reached by walking 2 km. straight west from Finca La Reunión, which is along this road a few km. further south towards Barranca Honda."

By this time I had spotted plants of a cereoid, epiphytic cactus (later identified as *Werckleocereus glaber*) on large trees lining the road. After gathering several specimens I believed them to be *Disocactus biformis*, for the natives described the flowers as being small and red, and the plant was narrow-branched and fragile, growing south only as far as Barranca Honda.

However, being in doubt, I walked south for some kilometers, crossing into the hotter Department of Escuintla after passing the dried creek-bed of the boundary river, Río Las Lajas, and later reached the village of El Rodéo. But my feet were now blistering and I was becoming more confused still; I had found another cereoid cactus, an *Epiphyllum* (probably *E. guatemalense*), and a glaucous form of *Rhipsalis cassutha*. As there was thus the probability of finding other cacti in this area I decided to resume my search the next day.

I found another species of *Epiphyllum* on March 8th, but there was no south-bound traffic that day, which delayed me considerably, and in the early afternoon I turned back to Alotenango.

"Mañana is market day," they told me, "there should be better traffic connections between Antigua and Escuintla, Señor!"

The next day, Saturday, was beautiful. The clouds had drifted away from the volcanoes, birds sang their morning melodies, and dozens of tropical lizards played on the sunny edges of the road. But there was no south-bound traffic that morning and I went on foot again from Ciudad Vieja to Río Las Lajas and, in the afternoon, back toward Alotenango—quite a stretch, I assure you.

At about 3 p.m. I met a group of Spanish-

speaking Cakchiquél Indians in the forest, and since I was back again on the border of Aguacatepéque I again cross-examined them about the local occurrence of other *pitabayas* (the native name for any scandent cacti and their fruits). I had little success, for the most notorious habit of the present-day Indian is that of answering all questions simply with "Sí, Señor" in order to please his interrogator. A beaten race, accustomed to centuries of suppression by their conquerors, these people prefer to invent the most startling exaggerations and lies, possibly fearing to lose face, or worse. You can ask them if the moon is green, and if the Indian thinks you believe this yourself he will answer "yes" without hesitating.

Consequently, the game of questioning the colorfully dressed natives proceeded as follows:

"Aren't there any *pitabayas* around here?"

"No, Señor, there aren't."

"But I see them with my own eyes in all the trees here! Don't you?"

"Sí, Señor, we see them too."

"Are there red-flowered ones among them?"

"Pues sí, there are!"

"Big or small?"

"Big and small!"

"What other colors do you have among the *pitabayas* here? White, pink, orange?"

"Sí, Señor, they all have white, pink and orange flowers."

"Hold it—all on the same plant I suppose?"

"Sí, Señor."

"Blue, green, yellow and black, too?"

"Sí, Señor, sí pues!"

That's when I gave up—a most fruitful conversation indeed! I could just as well have been talking to a parrot. Disgusted, I strode off, feeling that our distrust was also quite mutual: No man in his right mind walks unarmed through the back-forests of Latin America—they didn't, and neither did I.

Soon I reached the Río Guacaláte near Finca Santa Gusta. In front of me was an old tree leaning over the river gorge, and in it I could see long ribbons of *Werckleocereus* stems and the bright green tangle of an *Epiphyllum* (later identified at the U. C. Botanical Garden as *E. thomsonianum*). Another plant growing high upon the trunk and partly hidden by the *Epiphyllum* I at first thought was a *Peperomia*.

A minute later I was performing in the tree-tops a kind of hula-hula dance which, no doubt, would have been unanimously applauded by the Indians. There was a flowering specimen of *Disocactus biformis* hanging about me, while at the same time hundreds of vicious ants kept me desperately busy trying to dislodge them without plunging into the gorge. After all, one doesn't

want to celebrate the rediscovery of a plant lost for 65 years by breaking one's neck.

The belligerent insects didn't like the dance and soon retreated after suffering severe casualties. Though badly stung, I couldn't have cared less when I finally bagged three specimens of *D. biformis* out of a total of five that grew on the tree.

Continuing my search, I found the species to be missing in all trees investigated along the Guacaláte River, between Finca Santa Gusta (about 4 km. south of Alotenango) and the Indian village of El Matón. I returned to Finca La Reunión and started out to the west, following the Aguacatepéque trail toward the Volcan de Fuego for about 2 km. About 1.5 km. after leaving La Reunión I noticed another small plant of *D. biformis* in a tall tree near a lava-rock *barranca*, together with typical epiphytes of the Aguacatepéque region at the altitude of 1300 to 1400 meters: *Werckleocereus glaber*, a few more *Epiphyllums*, *Cattleya skinneri*, *C. aurantiaca*, *Epidendrum ciliare*, *Oncidium ornithorhynchum*, *O. cavendishianum* (?), *Stanhopea* species, spiny *Pitcairnia*s, xerophytic *Tillandsia*s, a few *Philodendrons*, *Peperomias*, *Begonias* and ferns.

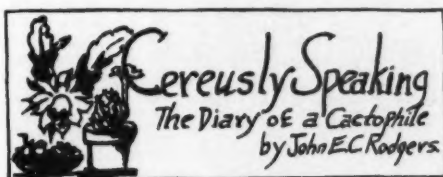
Shortly thereafter I reached the trail leading north over the upper part of Barranca Honda back to El Matón. Again the terrain offered nothing but dense, dry jungles, and the few larger trees bore only the above-mentioned epiphytes and also a few flowering plants of *Lycaste aromatica* and *Trichopilia tortilis*—but not one specimen of *Disocactus*.

The Barranca Honda range was completely impossible. The gulch was nothing but a river of lava, here some 300 feet wide, with a still smoldering bottom. While following the *barranca* uphill I was horrified when I stepped into a hidden hole filled with soft volcanic ashes, sinking down for about two feet into nearly burning temperatures. Quicksand couldn't have been worse! I pulled myself out instantly, grabbing hold of the nearest "lava-bomb" (large rocks hurled out by the volcano during eruption), but swore not to walk a step farther and returned to the *barranca* shores at once. Here the forest rim was burned or wilted, unfortunately including several old trees which might have hosted *Disocactus*.

In any event I found it futile trying to locate more specimens of this rare cactus on these relatively dry slopes and, finally, felt convinced that *D. biformis* was a humidity-requiring species confined in this area to the creek and river shores, those of the Río Guacaláte in particular. Possibly it also occurred in the cloud-touched forests of the central volcano, but these of course were now almost destroyed by lava—and again,

it could be present on the adjoining, dormant Volcan de Acatenango.

The sun had now hidden behind the black, threatening slopes of the Volcan de Fuego and it was getting dark. I quickened my steps, carrying with me the flower which so much symbolized, in its glowing color and shape, the flaming outburst of the Volcano of Fire, which only three weeks ago had threatened to convert the home of this species into smoldering ashes.



I get letters asking me for my culture methods with a limited group of plants which I have slighted because of rarity, inconclusive experiments, etc. I have compiled some information which I shall write about in this article.

The use of plastic materials is a fascinating subject for me since I hoard clear glass, plastic receptacles, plastic bags and what have you types. Plastic cottage cheese containers make good humidifiers for small moisture loving plants. I set the two and a half inch potted plant inside a three inch pot. I bore several small holes in the side of the plastic container; cover the smaller pot so that the edge of the plastic container is between the two and a half inch and the three inch pot. At present I'm growing rooted cuttings of *Epiphyllanthus obovatus*, *E. obtusangulus* and *Rhipsalis rosea* by this method. In the dryer house these three humidity lovers would stand still. The larger clear plastic bags I also use on pots from 3 to 6 inches. In these pots I use small size bamboo tie-sticks to hold the plastic bags from touching the plants. After watering the plants and placing the sticks, I slide the plastic bag over the sticks and down over the rim of the pot. Into the side I make an inch incision which I use to inflate the bag with my breath, add moisture and thus insure a snug miniature greenhouse. The growth these plants make in these "humidifiers" is amazing. Since these plants are shade loving it is obvious that there is no need to worry about damage from sunlight.

The hole piercing operation on the plastic container types is tedious since I use the sharp tips of a pair of scissors. The plastic is brittle and cracks easily but I can do it. (Some of the plastic bags are already perforated.) The several sizes of plastic bags used for freezing vegetables are ideal. I usually put the holes in the plastic at random so that moisture is retained and air is admitted. I have not used plastic bags where I have injected large amounts of carbon dioxide, but I have been giving it some thought. However, there are large amounts of carbon dioxide in my breath with which I keep the bags inflated.

Some people tell me they would rather lose the plants as not to see them but I tell these folks of the San Francisco collector who uses white or brown gallon jugs of various sizes from which he removed the bottoms by the cord-dipped-in-turpentine-set-on-fire method (a glass-cutter can also be used but it is more difficult). I must use the plastic method because of my limited space but the bottomless jugs might be the solution for collectors who need limited seasonal protec-

tion. Here where the temperature may vary from 18 to 107 degrees I can recommend this method. I use plastic on those that need this extra amount of moisture in my comparatively dry type of culture during the winter.

I store *Aloes*, *Haworthias*, *S. W. cacti*, *Epiphyllum* species, defoliated *Pereskias*, *Agaves*, *Opuntias*, etc. on the dirt floor under the benches. There is always water rising by capillarity from the soil outside of my greenhouse. These plants do not suffer from etiolation or shrivel from lack of water. It does not hinder their blooming either. The temperature is never lower than 38 and higher than 50 degrees. Except for syringing with a florist's syringe, these plants have had no water since November. A tepid spray keeps off the dirt and prevents shriveling of thin stemmed varieties.

I have found that household ammonia in the spraying water when I use the florist's syringe is quite beneficial. I begin just ahead of spring (usually the middle of February) and see to it that all *Epiphytes*, *Haworthias*, *Euphorbias*, *Gasterias*, *Selenicereus*, *Mammillarias*, *Gymnocalyciums*, *Parodias*, *Astrophytum*s, *Rebutias* and various succulents get a liberal supply. In large quantities I use half a cup to a gallon of water. According to latest experiments it is highly beneficial to green plants to spray with nutrients in the spray water as well as using it on the soil.

Since nitrogen causes vegetative growth, it should be supplied most freely during the springtime when growth is starting. An oversupply during summer and fall may cause root injury and cause the plants to grow late and not go into the dormant state for winter storage. A lack of sufficient nitrogen shows up in leafy plants in small, soft, light-colored foliage, small flowers, weak thin stems, and lack of strong growth.

I also use dissolved fertilizers when I detect lack of phosphorus (poor root systems and foliage, lack of flowers and slow growth of the plant), potash (slender, weak stems, poor flower color and leaves with brown or yellow blotches along the margins), which also contain besides nitrogen, trace elements such as manganese, magnesium, boron, iron, etc. I usually spray with this from the middle of February to the middle of April. By this time, root fertilizers can be given if necessary.

I am always getting new plants, making new contacts, writing many letters, etc. to prevent stagnation. My recommendations are: get a new book about cacti or succulents; trade off some familiar plants for new ones; start some new succulent plants from seed; begin a favorite plant collection or a friendship plant collection; visit your local greenhouse for those succulents that get tucked back from the regular trade; start a local book lending library; open your greenhouse to interested parties; share cuttings with shut-ins or help youngsters start a hobby; speak to garden clubs and show slides; hybridize a few and plant the seeds; study the fruits because not much has been done with them; keep a diary of your plants including weather records; check your plants for beauty and not just for bugs; check on do's and don'ts and neighbor's advice; study up on geography and places from which your plants came; travel if you can and keep careful notes of what you saw. And last but not least remember that cactus growers are of one blood and don't be afraid to stop.

These may sound like New Year's resolutions but they are all things I have done or am doing—all of which contribute to a more fascinating life. My one regret is that I'm not able to do more in fostering the cause.

JOHN E. C. RODGERS
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Lorain, Ohio

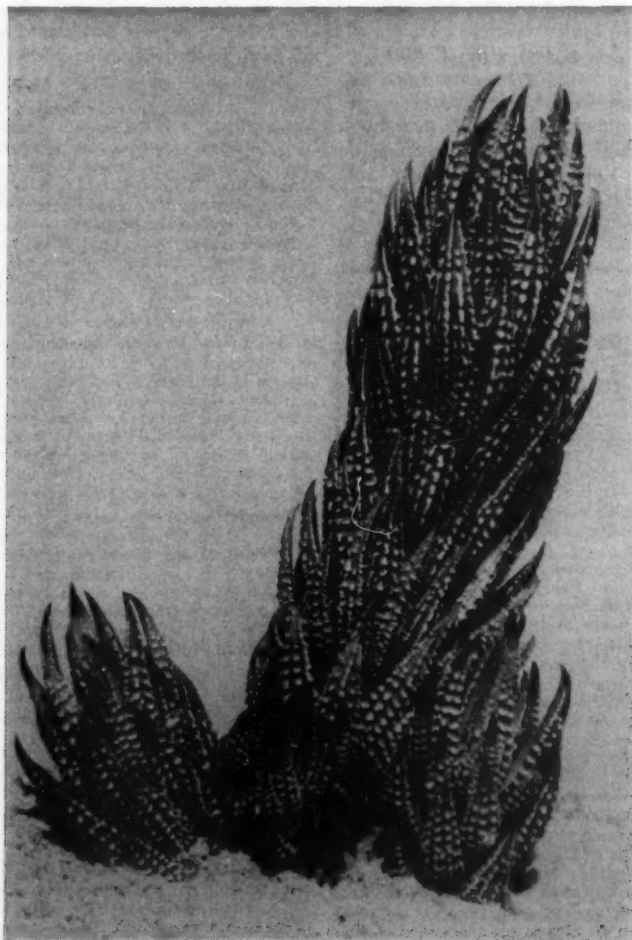


FIG. 30

Haworthia reinwardtii var. *kaffir driftensis* G. G. Smith nat. size

Notes on Haworthias

J. R. BROWN

Haworthia reinwardtii var. *kaffir driftensis*
G. G. Smith in Journ. So. Afr. Bot. IX (1943)
96. Pl. I and fig. 3.

Plant with leafy stems to 12 cm. long, about 3.5 cm. in diam., more or less erect, proliferous from the base and forming clusters with age.

Leaves multifariously crowded, erect, incurving, to 3 cm. long, to 10 mm. broad towards the base, to 3.5 mm. thick at midsection, lanceolate, acuminate, minutely cuspidate. Face of leaf flat-tish-convex, with 1 or 2 lightly raised concolorous lines, usually smooth but a few whitish

tubercles may occur on some of the oldest leaves. Back of leaves rounded and with pure white roundish tubercles arranged in 5-8 distinct lengthwise rows, tubercles on keel to 1.5 mm. in diam. becoming smaller towards margins, base and tip, often confluent lengthwise, on the margins the small crowded tubercles often coalesce in a more or less marginal band, dark green in color the face of leaf of a paler green.

Locality: South Africa: Cape Province. Peddie Div. near Kaffir Drift.

The snow-white, prominent and often conflu-

ent tubercles in longitudinal rows make this Haworthia one of the most attractive of the *Haw. reinwardtii* group.

A good illustration and some notes on this

Haworthia are given in the Cactus and Succ. Journal of Gt. Britain, vol. 13, 1951, under the heading "Variability within Haworthia reinwardtii" by A. J. A. Uitewaal.

SPOTLIGHT ON ROUND ROBINS

It gives me great pleasure and some satisfaction to state that there are twenty-four Robins in flight at this time, and except of four from which I have not had a report, all are actively going their various rounds. Marion Turnock, a member in several of our Robins, asked me to list them, which I shall be very glad to do. There are nine C. & S. Robins, numbers 1 to 10 (omitting No. 7 which has been disbanded), three International C. & S. Robins, one International Mamillaria Robin, one International Small Cacti and Mimicry Succulents Robin, two Euphorbia Robins, two Winter-hardy Cactus Robins, and one each of Succulents Only, Desert Dish Garden, Window Sill, Hybridizer's, Decorator's and Epiphyllum Robins. All but the last two have full memberships. The Epiphyllum Robin could take two more and the Decorator's three more members.

Besides these there are certain special Robins available to anyone desiring to participate in them. Two new ones, soon to take flight, are the Echeveria Robin and the Tree-type Cactus Robin, each, having three members, would welcome two or three more. Also on my memo and requested by members who have a keen interest in them are three Robins, one for Stapelias, another for Opuntias, and the last for Rare Cacti and Crests. There is plenty of room in any of these and a cordial invitation is extended to fellow enthusiasts to join one or more of these. For those of you desiring a Cactus and Succulent Robin I might say there is always one available even if I do not mention it and it is, of course, the one best suited to those who have general collections. When I receive a minimum of four or five members there is automatically a new Robin. I hope, even if you do not find just the special Robin you were looking for that you will write to me what you want and it might just happen that someone else wanted it too. I have a request for another Euphorbia Robin, which means that with a few more inquiries there will be a Euphorbia Robin No. 3, so you see it is important to write to get your name on the waiting list. It sometimes takes a while to gather a Robin's membership but it becomes a reality in time.

I am very happy to welcome the newest members to the Round Robin family. They are Miss Annie Dixon, St. Albans, Hertfordshire, England; Mrs. E. G. Hulse, Beaverton, Oregon; Mrs. Charlot McCombs, Santa Cruz, California; Mr. Ren W. Haskell, Calgary, Alberta, Canada; Mrs. Andree Stewart, Brunswick, Ohio; Mrs. J. M. Simmons, Houston, Texas and Mr. P. G. Nichols, Tucson, Arizona.

To start the news from the Robins I will begin with Vivian Hicks, who has been chosen Director of Robin No. 5, and who likes to make dish gardens. In her letter she writes, "I only use rocks and charcoal in the bottom of my dish gardens for drainage and go easy on the water." She explained before that the dishes she used were without drainage holes in the bottom. She continued, "I have one that I fixed over a year ago. I picked up some spineless Opuntia which had sent up some slim shoots. I anchored my pin holders and made the arrangement, then decided to add some little Mamillarias and button cacti that had roots and needed something to hide my pin holder. So filled the container with builder's sand, added a small cypress knee, some pixies and donkey. Well, everyone went wild over it. Since then some of the cacti have tripled in size. Some bloomed and the Opuntia has new pads." Ida Pruett

in the same Robin writes she always has a small hole drilled in all her dishes used for arrangements saying, "with care you can drill a hole in any glazed or Mexican dish. Drill from the outside, and it should be on something firm." Her husband puts a pad of cloth over a paint can, turns the bowl down on it and drills carefully. She suggests, "You can buy wire plant pins in the dime stores to anchor small plants, the kind you use to pin ivy to a totem pole. They work fine in dish gardens and are so easy to hide with soil." Of her own dish gardens she says, "I depend on a pot of Echeveria elegans—its rosettes of blue-white, spoon-shaped leaves are nice in an arrangement. Also I like Aeonium canariense as it looks like a green rose." In another letter of this Robin, Pat Pfeil tells of a cactus and succulent exhibit she was asked to set up, writing, "I had an area of 9' x 4'—placed plants in their pots on the floor, placed a sheet of oilcloth over them with slits in it for plants to stick through. Then I covered it with wall-paper paste and sprinkled sand over it. What a job! but it was worth it. I got the award of merit for the best horticultural entry. My plants were really working for me. My Aloe had a bloom stalk full of yellow flowers, the Christmas cactus was a mass of deep pink flowers. The night I took them over (had about fifty plants) it was zero and bitterly cold and the night we hauled them home it was -10 degrees. I didn't have time to cover them and just put them in the station wagon. Not even the flowering ones dropped buds." She had another bit to add in regard to cuttings when she said, "I always try to root everything I have for trading purposes with friends or interested guests and also use them for barter with a greenhouse. I get pots, soil mixtures and other supplies in return for the plants I give them."

(Mrs.) GLADYS H. PANIS

P. O. Box 705, Falmouth, Massachusetts

CACTUS & SUCCULENT SOCIETY OF CALIFORNIA

The January 11th meeting was called to order at the San Antonio Park Auditorium by President Jay Dodson. For this particular meeting the members were asked to bring their favorite slides and plants and the result proved to be an unusually interesting program.

A most complete series of slides showing progressive studies of plant and inflorescence development was shown by Dr. Arthur Bazell. Among other outstanding slides were those of Dr. H. M. Butterfield depicting some of his popular and colorful selections, such as a specimen of Echeveria Edna's Giant measuring 14" across, the coppery and crumpled Echeveria Ednita, and a ruffled Echeveria about 10" across named for our own eminent (and unruffled) Garden Show Chairman, Ralph Hillery.

A selection of rare plants was shown and discussed by Al Irving, among which was one of the two Ceropegias found in the Canary Islands, Ceropegia fusca. This cliff grower consists of straight, finger-thick, jointed stems, the older stems breaking off bluntly and remaining with the new growth. Because of its peculiar appearance and grayish color this plant has been described as resembling clumps of bones.

Mr. Irving also displayed the very rare Aloe compressa, imported by the late Dr. M. Morgan in 1956, and a few of his own new South African imports including Brachystelma barberii, Ceropegia conrathii,

and *Euphorbia hamata*. Noted by Mr. Irving was the interesting fact that the *Cotyledon wallichii*, a winter grower, and a summer growing *Cissus* grow side by side in their South African habitat. Also shown by Mr. D. R. Small and Dr. Butterfield was a varied group of *Echeverias*, which served to whet our interests for the next meeting.

We were very fortunate to have as our February guest speaker Mr. Eric Walther, Research Associate, Department of Botany, California Academy of Sciences, and Retired Director of Strybing Arboretum in Golden Gate Park. His subject was the genus *Echeveria*, in which he has been interested since 1929, and also related sidelights of his recent trips in Mexico and Europe where he toured the various noted botanical gardens, including the new garden site at Brussels.

At the present time Mr. Walther is preparing a monograph on the genus *Echeveria* and has so far subdivided it into 14 series, basing his groupings on various similarities of inflorescence structure, leaf characteristics, and so forth. In a comparison of the sometimes confusing *Cotyledon*, *Echeveria* and *Dudleya*, Mr. Walther noted a few of the outstanding differences in these *Crassulacea* for the amateur collector to remember for identification purposes. While the *Echeveria* has leaves easily detachable at a narrow base, the *Dudleya* leaf is attached securely around the stem of the plant and, thus, overlaps neighboring leaves. Both of these have a lateral bloom stalk, but have not been known to hybridize at the present time. The *Cotyledon* flower stalk originates out of the middle of the plant and the leaves are opposite each other.

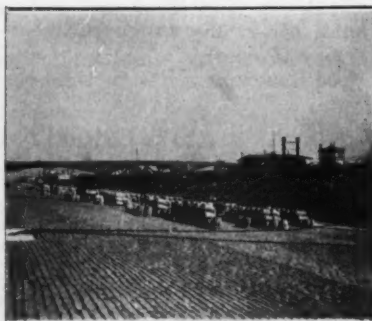
On the subject of hybrids, Mr. Walther emphasized that there seems to be no hybridization between species in the wild. On a recent trip to Mexico he found that the various species seem to grow more or less isolated from each other, although he did find *Echeveria chiapensis* blooming among the tree orchids with another species blooming on the ground not a hundred yards away. There was no evidence of hybridization here, however, *Echeveria chiapensis* is noted to have inflorescence of the type that is pollinized by bee rather than the typical *Echeveria* "hummingbird flower".

It is Mr. Walther's belief that *Echeverioideae* possibly originated from *Sedoideae* because many Mexican *Sedums* have lateral bloom stalks and resemble some *Echeverias* in appearance. Further evidence might be that *Sedum pachyphyllum*, *Sedum adolphii*, and *Sedum palmeri* have been crossed with *Echeveria derenbergii*. Actually *Echeveria coccinea* was the first *Echeveria* to become known in 1793, and *Echeveria parrasensis* (recently found by Reid Moran in Mexico) was grown in Italy as far back as 1904.

The average amateur grower rarely considers the processes of preparing monographs and specimens. Mr. Walther described the preparation of *Echeverias* for herbarium specimens as follows: boil plant, drain, place in press and leave on a radiator or heater for about four days. It is doubtful that this recipe will be in demand by many of the readers, but it was of great interest to our members.

Mr. Walther responded to the many questions that followed his presentation and discussed the wide collection of *Echeverias* brought by Myron Kinnach, Dr. Butterfield, Mr. Small, the Jay Dodsons, and others, bringing to a close a most stimulating meeting with the sincere hope of all in attendance that we would soon again have the opportunity of hearing such an informative speaker.

MARY ELLEN QUESADA
Affiliate Secretary



OLE MAN RIVER

St. Louis is the hub of the fabulous Ole Man River which today is a busy artery of intra- and inter-national trade on a vastly greater scale than during the days of the picturesque steamboats.

Since the City's founding in 1764 and especially since the landing of the first steamboat in 1817, the Mississippi River has played a vital role in the development of modern St. Louis. Although river traffic has lost some of its glamour since the days of Mark Twain and the gilded floating river palaces, its modern barges and towboats have replaced the quaintness with streamlined efficiency.

St. Louis is located just below the junction of the Mississippi with the Missouri and the Illinois rivers and, consequently, is virtually capital of the 40,000 mile inland waterways system of the nation, linked thus with 26 central states and operating virtually as a port city through its direct waterway to New Orleans. This has become of increasing importance with the expansion of Mississippi Valley trade with Latin America.

During the war, St. Louisans became accustomed to seeing such strange crafts as landing vessels, submarines, and military ice-breaker boats shipping down the Mississippi to the ocean enroute to their battle stations. Another wartime contribution of Ole Man River was the transporting of millions of gallons of oil and tons of raw materials from the south to the huge northern industrial establishments for conversion into the tools of battle.

Despite the replacement of the steamboats by more prosaic craft, St. Louis retains many of the river's traditional attractions. For example, the old Goldenrod Showboat is permanently anchored at the city's waterfront to divert natives and visitors with the amusing melodramas of a bygone era.

Moreover, the luxurious S. S. Admiral, the largest and finest inland passenger steamer built in America, plies the river through the summer months with throngs of pleasure seekers. Air-conditioned, complete with dance hall, cocktail lounge, restaurant, the Admiral has five decks with a top sun-and-moon deck for romantic lounging and sight seeing. It makes both day and night voyages along scenic sections of the river.

Although the city's residential life has moved west, away from the river, much of the commercial and industrial activity still concentrates on St. Louis' 19 miles of riverfront. And the projected Jefferson National Expansion Memorial, which is to be erected by the National Park Service as a tribute to Thomas Jefferson who arranged the Louisiana Purchase, will be located on the downtown riverfront on a 37 block site already acquired for that purpose.

You have a date in St. Louis in July



You have at date in St. Louis in July! The eighth biennial cactus convention will definitely now be held on July 8, 9 and 10, with headquarters at the beautiful Holiday Inn Hotel, only a mile south of the St. Louis Municipal Air Terminal. We'd love to see every Affiliate Club represented, but remember the convention is open to all cactus enthusiasts and their friends, regardless of membership or no membership in any cactus club. Once you attend a cactus convention you are bound to attend many others in the future. You gain knowledge from the lectures, you meet wonderful folks, and you will derive lots of fun from the entertainment prepared expressly for this grand get-together.

Soon you will be getting an information sheet and reservations form. We hope you will give it prompt attention. Get your reservations in as early as possible to be assured of best rooms, but all of them are choice at Holiday Inn. Should you have to cancel your reservation, refunds will be made in full if made in time for your Convention Committee to avoid financial loss. Mr. Fred A. Eisele, the convention treasurer, will handle the reservations for you. If there is anything to know about it, please contact him at 241 Selma Avenue, St. Louis 19, Missouri.

All three full days of convention activities will be spent at Holiday Inn, our headquarters, but we expect the members to stay over an extra day for a tour of the Missouri Botanical Garden where an outstanding cactus show will be staged especially for you. When Harry Johnson, President of the Cactus and Succulent Society of America, arrived in St. Louis for a conference he pronounced the Holiday Inn to be the finest of all meeting places we've had so far. Holiday Inn has over 150 spacious, luxuriously appointed, comfortable rooms ranging in price from \$7.50 per person to \$17.50 depending upon the number of people to be accommodated in a unit. Each room is air-conditioned and supplied with a television set. There is a swimming pool, gift shop, coffee shop, a modern cocktail lounge, service station, kennel service, baby sitting service and every modern convenience known to make your stay a comfortable one. Those of you who plan to travel by air will find a direct line (telephone) at St. Louis Municipal Airport. Dial HARRISON 8-8900 and your call will bring an immediate Holiday Inn ranch wagon for direct transportation to your quarters at Holiday Inn. If you plan to travel by train or bus, please notify the Convention Treasurer, Fred A. Eisele, of the time and place of arrival. Our transportation committee will meet you at your terminal.

Luncheons and dinners are expected to be taken at Holiday Inn for which tickets will be provided upon registration. Breakfast is optional. Schneithorst operates Holiday Inn and this firm has a reputation for serving fine foods in this area. The luncheons will average \$2.25 and dinners from \$3.25 to \$4.50, taxes and gratuities extra. For folks who are on a fat free diet or have other problems of food, kindly make a notation on your reservation form and Melvin Daniels, the manager, will accommodate your wishes. However, we must know this ahead of time so that arrangements can be made for the special diets.

As usual there will be very attractive door prizes to be given away at each session. Refer to your Program

and be on time to share in the drawings. We hope to have nice plants, good books and plant containers as prizes. If any of you readers are inclined to be generous in this cause, send your money or material direct to me at the Garden (Ladislav Cutak—2315 Tower Grove Avenue—St. Louis 10, Missouri) and I'll forward it to the local committee in charge of this portion of the program.

Right now we are trying to line up as many good speakers as possible and indications point out that we will have excellent illustrated and instructive lectures to satisfy everyone's tastes. One period will provide for slides of past conventions and your favorite cactus and succulent. Choose your very best ones and bring them along for this program.

We are urging each affiliate society to nominate their choice of a king and queen direct from their own group and to submit their names to the committee on the first day. All others not affiliated with any particular group will have a chance to pick their choices from those in attendance. In the evening the royal couple will be elected from the list of nominees. The pair will then preside at all the remaining sessions and that way everyone will get better acquainted with the reigning pair.

The last evening of the program has been reserved for the riotous Fun Session, which will be in charge of Pat and Slim Moorten of Palm Springs and their committee from the host society. This is "when we let our hair down" and become a fun-loving, zany lot of Cactomaniacs. There is no plant group that has as much fun as ours. Everyone, young and old, gets in the act. A Hat Contest will be one of the features. Let's make these hats the most elaborate, the most outlandish, the most unique and bizarre ever shown anywhere. Don't be afraid to decorate with live plants (cacti and succulents preferred, of course) and other accessories. You may even get into the rotogravure section of a newspaper or even on television. Who knows? Another feature will be a costume contest. We know that many of you will wear dresses, shirts, skirts, blouses and ties with appropriate cactus designs probably throughout your stay here, but let's make the costume contest something excitingly different. Come dressed as a barrel cactus, a torch cactus, a spiny hedgehog, a vicious prickly pear or some delectable succulent. Think seriously about this and you are bound to come up with an excellent idea. Don't postpone it till the time of the convention—you got to work on the idea now! As usual some hilarious stunts and skits will be planned for the initiation ceremonies. Don't be afraid to offer suggestions. Send them in to me as soon as possible so that the committee can make them adjustable to our needs. This convention is a cooperative project and to insure success everyone is expected to do his share. Can we count on you?

We are hoping that most of you can stay over an extra day (Saturday, July 11) to tour the Missouri Botanical Garden. This would best be done by chartering buses. A giant cactus show is being planned for the month of July at the Garden and there will be many worthwhile exhibits. Cactus growers all over the United States are invited to send in exhibits. Remember, too, 1959 is the Centennial year of the Garden and

25 for \$12.50	50 for \$22.50
10 Specimen Mammillarias.....	\$ 6.00
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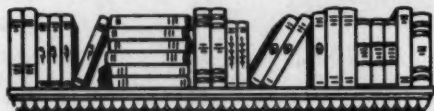
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—bring results. Two of last month's advertisements brought in 71 and 90 orders respectively. Why not run an advertisement in the next issue at \$5.00 per column inch? Mail your copy by May 1.

Pasadena, Calif.



Britton and Rose reprint is now priced at \$100 and Marshall and Bock's *Cactaceae* is raised to \$10.00. Previous prices are cancelled. Abbey Garden Press.

The out of print January 1959 issue of *Arizona Highways*—contains 26 beautiful color pictures of cacti—what they are and their structure; how they are grouped; and many interesting facts from cactus land. Also feature stories: "Desert Drug Store"; "Cliff Dwellings in Cactus Land"; and "Desert Tunnel"—a fabulous description of a Desert animal museum. Post-paid \$1.00

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This amusing book of cartoons by Reg Manning is a "who's who" of these strange cacti of the American deserts. True botanical facts are presented with a chuckle on every page. Obtain a copy for your friends so that they may better understand your weaknesses and interest in cacti. \$2.40 postpaid.

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